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CONTENTS

	PAGE
Balfour-Browne, J., M.A., F.R.E.S. New and interesting aquatic Coleoptera from the Sudan	133–142, 5 figs.
Fraser, Lt.-Col. F. C., I.M.S., Retd., F.R.E.S. The synonymy of *Enallagma elongatum* (Martin) and *E. pseudelongatum* Longfield, and their differentiation from a new African species (Order Odonata)	143–148, 2 figs.
Strickland, A. H., M.A., F.R.E.S. Three new species of Coccoidea (Hemiptera—Homoptera) from the Gold Coast, British West Africa	149–156, 30 figs.
Book Notices	142
General Index	157–163

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NEW AND INTERESTING AQUATIC COLEOPTERA FROM THE SUDAN

By J. Balfour-Browne, M.A., F.R.E.S.
(*British Museum* (*Natural History*).)

The following short notes and descriptions of new species from the Anglo-Egyptian Sudan are largely based on material sent to me by Dr. P. H. Abbott of the Sudan Medical Service collected in and around the Gebel Marra, and material from south-east Sudan and in the Didinga and Imatong mountains close to the Uganda border collected on a recent trip by my friend Mr. D. J. Lewis, also of the Sudan Medical Service, to both of whom my thanks are due for most interesting material.

Positions and altitudes of places from which Mr. Lewis's material came are as follow :—

	N.	E.	Approx. Altitude
	° ′	° ′	
Gilo*	4 03	32 48	4,600 feet.
Nagichot	4 16	33 34	1,976 metres.
Dueim Zubeir	7 43	26 13	560 metres.
Khor Shumam	8 32	25 47	2,400 feet.
Near Gel River*	7 02	29 10	490 metres.
Miri Area*	4 30	30 50	650 metres.
Yambio	4 34	28 24	2,375 feet.

* Data very approximate.

Gilo being in the Imatong Range, Nagichot in the Didinga Mountains. Practically no collecting of Coleoptera seems to have been done in this area previously, but Hale Carpenter has contributed several articles on the butterflies of the area and he refers to a definite western element in the fauna. Such a western element is found to be present in the aquatic Coleoptera and it is remarkable that some of the species found have not been known from other than extreme West African localities hitherto. It is hoped that ultimately it may prove possible to make a survey of the aquatic coleopterous fauna of the Sudan from a zoogeographical standpoint and information is being collected to that end.

Canthydrus xanthinus Régimbart.

Canthydrus xanthinus Régimbart, 1895, *Mem. Soc. ent. Belg.* **4** : 127.

This little species was originally described from Senegal and its presence in East Africa has only recently been noted. Guignot (1938, *Miss. Sci. Omo* **4** (31) : 43) records the species for both Kenya and Uganda. It is, therefore, of interest that a short series was received from South-east Sudan : Nr. Gel River, 16.iii.1946, and also from Miri Area, 20.iii.1946 (*D. J. Lewis* coll.). The species is not included in the Belgian Congo fauna studied by Gschwendtner (1930–32, *Rev. Zool. bot. Afr.*), and it may be that it does not extend south of the 5° N. line. It is recorded from the French Sudan : Bamako by Guignot (1943, *Rev. franc. Ent.* **9** : 96), the only intermediate station so far recognised between the east and west African areas of distribution.

Clypeodytes (s.str.) *cribrosus* (Schaum).

Hydroporus cribrosus Schaum, 1864, *Berl. ent. Z.* **8** : 107.
Bidessus cribrosus Sharp, 1882, *Sci. Trans. R. Dublin Soc.* **2** (ii) : 345.

There is still some evident confusion as to the identities of some of the species of the *cribrosus*-group of *Clypeodytes* (s. str.). Guignot (1938, *loc. cit.*, 22) gave a key for the determination of the African and Madagascan species of the subgenus. Later (1943, *Rev. franc. Ent.* **9** : 88) he presented a revised key necessitated by the raising of two forms to specific rank from the varietal status accorded them in the earlier key. A study of his keys and the accompanying remarks has convinced me that the *cribrosus* of these two papers is not the true *C. cribrosus* (Schaum). There is a female in the British Museum received from Kiesenwetter and labelled "*cribrosus* mihi" on blue paper in handwriting I believe to be that of Schaum. This specimen bears, in addition, a British Museum co-type label, I think correctly. There is also the "type" specimen of Sharp (*i.e.*, that used by Sharp for his redescription of the species), a male, which has been dissected. The co-type female before me has the head and pronotum entirely devoid of microreticulation between the punctures and the elytra not superficially reticulate but with fine incisions radiating from the punctures and not anastomosing to form a reticulation. Sharp's male agrees precisely with the female in these respects and is undoubtedly conspecific with the co-type. Régimbart (1895, *Mem. Soc. ent. Belg.* **4** : 62) states that his *cribrosus*, recorded from "Egypt : Caire, Ramleh, Shubra ", has "une réticulation superficielle extrêmement fine" on the elytra which extends, although less distinctly, on to the head and pronotum in the female. He later recorded the species from Eritraea and Kenya.

Omer Cooper (1931, *Proc. zool. Soc. Lond.* **1931** : 764) records the species from Abyssinia in "a short series, all differing from Sharp's type of *C. cribrosus* Schm. in colour and size." She goes on to state, however, that they do agree with specimens labelled *cribrosus* in Régimbart's collection, "particularly with one collected by Andreini in Eritraea." Only three females from the material studied by Omer Cooper are available for examination. In these specimens the head is strongly and distinctly microreticulate between the punctures, the pronotum and elytra rather obsoletely finely microreticulate. It seems that even these specimens do not agree with Régimbart's description of the species ; they also differ from the co-type female. Guignot (1938) regards *cribrosus* as having a dimorphism in the female, one form having the head and pronotum microreticulate, the second form having the upper surface shining, only the apex of the elytra being microreticulate. In his second paper (1943) Guignot states that further material has enabled him to satisfy himself that his earlier opinion was erroneous and he now regards *cribrosus* as being sexually dimorphic, the males shining, the females microreticulate on the dorsum. As has been shown above, the co-type female is in complete contrast with this second view and there is, very probably, a dimorphic female in this species. In the absence of males of the series studied by Omer Cooper, I am disinclined to come to any definite conclusion as to the actual identity of the Abyssinian and

Eritraean insects. It is perfectly possible that they do, as she hints, belong to a distinct species which will, in that case, be an undescribed species. That this is, perhaps, the more likely answer to the problem may be seen in the fact that of a good series of this group before me from Uganda not one specimen can be assigned to *cribrosus* and there are, in fact, four apparently undescribed species in the series. Of the true *C. cribrosus* (Schaum) I have seen only a few specimens from Lower Egypt and a single male from SUDAN : Khor Shuman, 8.iii.1946 (*D. J. Lewis* coll.). All other distribution records require revision. I have seen nothing from Kenya which could be ascribed to this species.

Clypeodytes (Leiodytes) distinctus sp. n.

Brevis, sat latus, ovatus, convexiusculus, flavo-testaceus ; capite antice late rotundata ; thorace utrinque plica obliqua. in elytris sat longe prolongata, instructa ; elytris confertim, evidenter punctulatis, basi, sutura lata, postice post medium excurrenta, ante apicem abrupte angustata, maculaque elongata ovata sub-laterali, nigris ; subtus testaceus, metasterno metacoxisque sat confertim evidenter punctulatis.

Head flavo-testaceous, anteriorly widely rounded, weakly produced, finely margined ; between the eyes finely and sparingly punctulate, the interstices sub-nitid, finely and somewhat obsoletely microreticulate. *Antennae* distinctly serrulate anteriorly, segments 5–10 about as long as wide at the apex. *Pronotum* flavo-testaceous, the sides weakly arcuate anteriorly ; on the disc very finely sparingly punctulate ; near the base more strongly and more coarsely punctulate, almost as strongly as at the base of the elytra ; on each side with a distinct fine plica attaining about half the length of the pronotum from the base. *Elytra* testaceous, the base, the suture widely to shortly before the apex, narrowly in the apical sixth, the sutural macula turning outwards behind the middle, and an elongate oval sublateral median macula black ; closely and distinctly punctate, the interstices on the disc barely more than the diameter of the punctures. shining, very finely and shortly pubescent. *Venter* testaceous ; prosternal process elongate, finely and acutely margined or medio-longitudinally canaliculate ; metasternum and metacoxae fairly closely and rather coarsely but shallowly irregularly punctate, the interstices from one-half to twice the diameter of the punctures. *Legs* flavous, basal segments of the anterior and intermediate tarsi of the male scarcely recognisably broader than in the female. *Aedeagus* with the median lobe weakly curved, narrow, elongate, weakly attenuate from the base to four-fifths of the length, then weakly explanate and rounded, the apex sharply rounded ; lateral lobes simple, bi-articulate, narrow.

Size : 1·564-1·665 mm. long ; 0·888-0·999 mm. lat.

Holotype ♂, SUDAN : Khor Shuman, 8.iii.1946, 267 G. (*D. J. Lewis* coll.).

Allotype ♀, same particulars as holotype.

Paratypes, 5 specimens, same particulars as holotype.

This little species is closely related to *C.* (*L.*) *evanescens* (Boheman), which it closely resembles in colour pattern. It differs, however, by its rather shorter, broader form (it should be noted that Boheman gives the size of *evanescens* as "Long. ¾, lat. ½ mm.," whereas Régimbart records the length as 1½ mm., and specimens from Estcourt, Natal, identified as this species in the British Museum are 1·665–1·739 mm. long., 0·825–0·981 mm. lat.) and the much stronger and more evident closer punctation of the elytra. The colour pattern is rather variable, from the distinctly patterned form described to one in which the black maculation is reduced to a quite narrow sutural stripe gradually attenuate from base

to apex. *C. evanescens* (Boheman) was described from "*Caffraria interiore*" ; Régimbart (1895 : 66) records it from Natal and Transvaal and mentions a single specimen from Congo : Boma (Tschoffen) "à dessins noirs un peu plus développés et à ponctuation un peu plus forte" which sound suspiciously like *distinctus*. Guignot (1938 : 21) records *evanescens* from Uganda without comment ; although there is no reason to doubt this determination, it appears to me desirable that the specimens should be re-examined as a means of delimiting more precisely the respective areas of distribution of these two very similar species. None of the short series of *evanescens* available for study is a male, and I am unable to discover that any figure of the aedeagus of this species has ever been published or any description given ; it is, therefore, impossible to compare the two species in this character.

Bidessus sodalis Guignot.

Bidessus sodalis Guignot, 1939, *Bull. Soc. Sci. nat. Vaucluse* **10** : 54.

This little species was described on a pair from the Upper Volta : Bobo-Dioulasso. It was therefore somewhat surprising to discover it to occur in D. J. Lewis's material from Sudan : Yambio, 21.iii.1946, 267 J, as a short series of four specimens, 1 ♂ and 3 ♀ agreeing perfectly with the description. None of the species of the *perexiguus* (Kolbe) group has previously been recognised from East Africa.

Guignotus dakarensis (Régimbart).

Bidessus dakarensis Régimbart, 1895, *Mem. Soc. ent. Belg.* **4** : 90.
Guignotus virgatipennis Guignot, 1939, *Bull. Soc. Sci. nat. Vaucluse* **10** : 55, fig. 3.

This is a further species hitherto known only from West Africa. It was originally described from Senegal : Dakar and has since only been recorded from Ivory Coast : Toumodi (*virgatipennis* Guignot). A single male from Sudan : Darfur Province (Nyala, Southern District, "Roadside pond," 1945) (*P. H. Abbott* coll.) provides an extraordinary example of discontinuous distribution which must almost certainly be due to the accidents of collecting.

Yola (s. str.) **darfurensis** sp. n.

Late ovalis, postice sat acuminatus, depressiusculus, flavescens, elytris longitudinaliter vage fusco-maculatis ; pronoto utrique plica sat longa obliqua fortiter instructa ; elytris utrinque fortiter bi-costatis, interna fortiore, postice abrupte desinente, externa postice regulariter reducta, aliaque tertia levissime externaliter post humeros ; confertim fortiter irregulariter punctatis. Subtus testaceus, segmentis intermediis abdominis lateraliter fuscis ; metasterno, metacoxis segmentoque basali abdominis regulariter confertim punctatis, punctis grandis sed vadosis. Femina ignota.

Head flavo-testaceous, anteriorly widely rounded ; anteriorly on each side with a large shallow, microreticulate impression ; moderately strongly punctulate, more sparingly anteriorly, closely, almost rugosely near the transverse vertical stria, the interstices shining. *Antennae* flavo-testaceous, moderately elongate, the middle segments two and a half times as long as wide at the apex. *Pronotum* testaceous, distinctly transverse, on the disc closely and as strongly but shallowly punctate as near the vertex of the head, rather more sparingly towards the sides ; with a strongly impressed elongate oblique plica on each side attaining almost to the front margin of the cephalic emargination ; the sides rounded, more strongly so in the anterior half. *Elytra* testaceous with an obscure longitudinal

maculation of fuscous stripes anastomosing near the base, at the middle and in the posterior third ; irregularly, closely and strongly punctate, the punctures testaceous, the interstices about one-half the diameter of the punctures, shining, with fine lines radiating from each puncture but not anastomosing to form a reticulation ; with two strong and one weak costae on each side, the internal (discal) costa the stronger, posteriorly ending abruptly without forming a distinct tubercle ; the intermediate costa quite strong at the base, progressively reduced towards the posterior end ; the external costa very weak, behind the humeral angles, all three attaining almost two-thirds of the length of the elytra from the base. *Venter* testaceous, the median segments of the abdomen blackish towards the sides ; prosternal process almost non-canaliculate, unmargined, rugosely punctured ; the metasternum, metacoxae and the basal abdominal segment rather strongly but shallowly punctate, the interstices from one-quarter to one-half the diameter of the punctures ; middle of the metasternum and metacoxal lamellae excavated, with a nearly linear series of large deep punctures on each side ; fused second and third abdominal ventrites black at the sides, irregularly, very shallowly punctate ; fourth and fifth segments sparsely finely punctate, shining. *Legs* flavo-testaceous ; two basal segments of the anterior and intermediate tarsi distinctly dilated, third segment weakly lobate, fifth segment almost as long as the three basal segments taken together ; anterior tarsal claw simple, almost identical with the posterior claw. *Aedeagus* with the median lobe regularly weakly curved, regularly attenuate from base to apex, the apex acutely pointed ; lateral lobes bi-articulate, the distal piece terminally strongly curved and sharply pointed.

Size : 2·261-2·356 mm. long., 1·254 -1·292 mm. lat.

Holotype ♂, SUDAN : Darfur ; East Jebel Murra, Kirima, 5,525 feet, 20.v.1932 (*M. Steele* coll.).

Paratype, 1 ♂, same particulars as holotype.

This species appears to come nearest to *Y. grandicollis* Peschet from Rhodesia and Natal (? Kenya) with a very similar aedeagus. It is evidently larger than that species and appears broader, the anterior claw of the male is simple (in *Y. grandicollis* Peschet the anterior claw of the male is evidently thickened, flattened beneath and slightly shorter than the posterior claw), the pronotal punctures are of approximately the same size throughout, the pronotal plicae are distinctly oblique though less so than in the closely related *Y. natalensis* Régimbart, and the black sides of the median ventral segments are a ready means of separation from *grandicollis*.

Herophydrus nodieri Régimbart.

Herophydrus nodieri Régimbart, 1895, *Mem. Soc. ent. Belg.* **4** : 37.

Again a West African species, originally described from Senegal. It has recently been recorded from Uganda by Guignot (1938, *loc. cit.*, 32), but there appear to be no other records. A single male was taken in SUDAN : Darfur, Nyala, Southern District, "Roadside pond," 1945 with the unique specimen of *G. dakarensis* (Régimbart) already discussed.

Potamonectes (s. str.) **lynesi** sp. n.

Elongato-ovalis, convexiusculus, testaceus, capite utrique ad oculos, prothorace antice anguste, postice latissime, elytris ad basin transversim, longitudinaliter plus minusve distincte lineata, nigris. Subtus nigricans, pedibus fuscis vel fusco-testaceis, femoribus in medio nigricantibus ; unguiculis anticis maris elongatis, simplicis.

Head testaceous, on each side near the eyes blackish ; closely finely and very shallowly punctulate, the interstices distinctly microreticulate, with scattered deeper and stronger punctures between the eyes. *Antennae* testaceous, the segments more or less infuscate

apically. *Pronotum* testaceous, anteriorly narrowly, posteriorly very broadly black, frequently almost entirely black and only vaguely fusco-testaceous just behind the anterior cephalic emargination ; the sides weakly rounded in the posterior half, more strongly so in the anterior half, distinctly but not strongly margined ; sculptured as on the head, with a transverse band of anterior coarse punctures and a posterior band of strong, but not coarse punctures in the scutellar region. *Elytra* with a narrow transverse basal band and more or less distinctly longitudinally lineate black vittae which frequently coalesce over almost the entire surface ; finely, closely and shallowly punctulate, the interstices obsoletely microreticulate, particularly so in the female, with a sub-sutural series of widely spaced coarse but shallow punctures and obsolete large punctures in the normal systematic series ; near the apex the epipleurs with a small but distinct obtuse tooth, more distinct in the female than in the male. *Venter* blackish, the pro- and meso-coxae, the apex of the metacoxal lamellae and the abdominal ventrites in the middle obscurely fusco-testaceous ; prosternal process very weakly transversely convex, finely margined ; metasternum, metacoxae and abdominal ventrites very closely finely punctulate, the punctures on the metacoxae coalescing and forming fine transverse rugosities. *Legs* fusco-testaceous or fuscous, the middle of the femora black ; three basal segments of the anterior and intermediate tarsi of the male distinctly dilated, the fifth segment of the anterior tarsi quite short in both sexes, not longer than the third segment ; anterior tarsal claws of the male longer and stronger than in the female, alike, otherwise unmodified. *Aedeagus* with the median lobe regularly attenuate from the base to the acutely pointed apex, the lobe abruptly curved in the basal half, almost straight in the apical half.

Size : 4·543–4·851 mm. long, 2·310–2·541 mm. lat.

Holotype ♂, SUDAN : Darfur Province, Jebel Murra, 10,000 feet, 9.iii. 1921 (*Admiral H. Lynes* coll.).

Allotype ♀, same particulars as holotype.

Paratypes, 2 ♂, same particulars as holotype. ♀, Jebel Murra, 7,500 feet, 9.iv.1920 (*Admiral H. Lynes* coll.) ; ♂, Jebel Murra, Katanga, 6,650 feet, 19–23.iv.1932, west side of mountain (*M. Steele* coll.) ; ♀, Jebel Murra, Koronga, "edge of sluggish stream," 1945 (*P. H. Abbott* coll.).

This species appears to be a member of the *elegans* group of Zimmermann's study (1933, *Kol. Rundsch.* 19 : 160) with the greatest pronotal width at about the middle, not in the basal third. It is apparently most nearly related to *P. clarki* (Wollaston) of the species of this group, but is readily distinguished by the rather wider pronotum, the piceous legs, the extensively piceous lateral parts of the head and the much more extensive piceous pronotal and elytral markings. *P. clarki* (Wollaston) is a Lusitanian species occurring through the Mediterranean, particularly in the western half. I have not seen the species recorded from Egypt, but it was recorded from the Hoggar Mountains by Peyerimhoff (1931, *Miss. Sci. du Hoggar* (Col.) : 22). It is therefore a rather remarkable discovery to find a related species in the isolated Jebel Murra massif and, so far as I know, the only representative of the north-west African fauna present there, at least among the aquatic Coleoptera.

Copelatus lewisi sp. n.

Elongato-ovalis, minus latus, depressiusculus, capite et pronoto rufo-testaceo, hic postice pervage infuscato, ille antice angustissime vage nigrescente, elytris fusco-brunneis, striis decem aliaque submarginali instructis, prima post medium nascente, 3a, 5a, 7a, 9a fere usque ad apicem attingentis ; 2a, 4a, 6a, 8a, 10a postice abbreviatis. Subtus testaceus,

epipleuris post basin nigrescentibus. Mas, tibiis anticis ad basin subtus leviter bi-emarginatis; segmentis tribus basalibus tarsorum anteriorum intermediorumque modice dilatatis.

Head reddish-testaceous, posteriorly very vaguely infuscate, very finely but quite sharply reticulate, the areoles very small and rounded, with an interspersed sparing excessively fine punctation; just inside the eye on each side a short longitudinal impressed punctate line with a very short transverse branch near the anterior extremity. *Antennae* simple, moderately elongate, entirely reddish-testaceous. *Pronotum* reddish-testaceous, anteriorly vaguely very narrowly blackish and frequently clouded on the disc; with a basic reticulation as on the head, the punctation very slightly more conspicuous and more scattered; on each side with some short deeply impressed but fine strioles which tend to become more numerous and closer near the posterior angles; margins very narrow. *Elytra* with a basic reticulation and very fine punctation as on the pronotum; with ten entire striae and a submarginal stria on each elytron sharply and evenly impressed, the odd striae extending almost to the apex, the first beginning at or slightly behind the middle

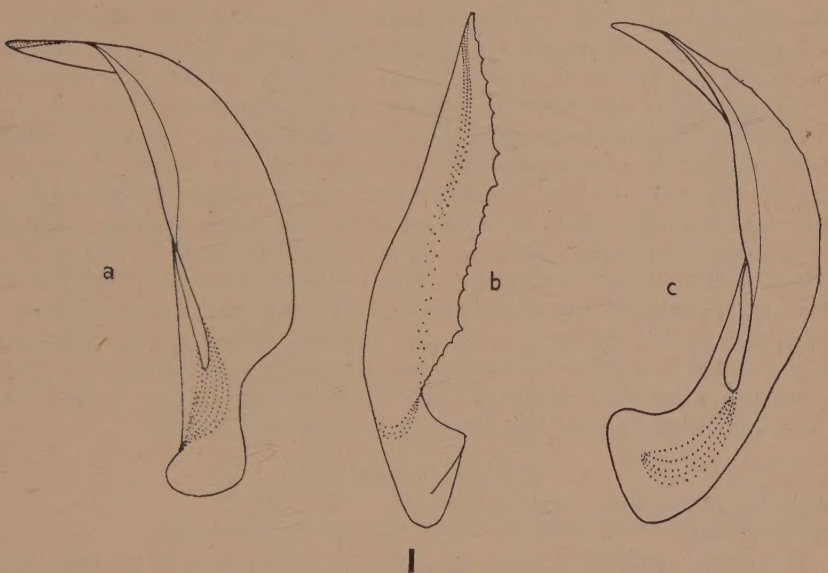


Fig. 1.—*Copelatus lewisi* sp. n. Aedeagus (*a*) lateral aspect, (*b*) serrations of the convex (ventral) edge; (*c*)—*Copelatus ornatipennis* Zimm., lateral aspect.

(occasional specimens have a short punctiform impression in the scutellar region which is in the direct anterior line of the stria), the even striae shortened posteriorly, the second to eighth striae commencing slightly behind the base, the ninth stria a little farther back, the 10th stria right at the base; the submarginal stria commencing at or about the middle and extending back to about the level of the termination of the second stria; the female sculptured as the male. *Venter* testaceous; the prosternal process ovate, the apex bluntly rounded, transversely convex, distinctly margined; hind coxae very finely microreticulate, the areoles slightly compressed and elongate, with a few fine oblique longitudinal strioles near the sides, very much fewer than on the basal segments of the abdomen. *Legs* testaceous; the three basal segments of the anterior and intermediate tarsi of the male moderately dilated; anterior tibiae of the male weakly bi-emarginate at the base beneath; anterior femora in the male with a small tuft of long stiff hairs at the base of the posterior edge of the ventral (tibial) furrow, followed by a series of 16–18 evenly spaced short blunt tubercles or denticulations, followed by a series of about 6–8 stiff hairs; in the female simple, the posterior edge of the ventral furrow of the anterior femora normal, with a series of stiff hairs. *Aedeagus* as figured, figs. 1*a*, *b*.

Size: 5·88–6·65 mm. long., 3·08–3·36 mm. lat.

Holotype ♂, SUDAN : Didinga Mountains, Nagichot, 1,976 metres, 31.iii.1946. 267 C. (*D. J. Lewis* coll.).
Allotype ♀, same particulars as holotype.
Paratypes : 6 ♂, 5 ♀, same particulars as holotype.

This species, belonging to Sharp's Group XII (Group 5 of the rearrangement suggested by Guignot (1946, *Miss. Sci. Omo* 6 (58) : 286), would seem to belong to the sub-group "*vigintistriatus*" of Guignot's arrangement, of which the only East African species is *ornatipennis* Zimmermann, with a West African representative *flavidus* Régimbart. *C. flavidus* Régimbart, described from a female specimen, is unknown to me except by description ; *lewisi* should be readily recognisable therefrom by the entire second elytral stria as well as by the darker colour of the elytra, larger size, by the reversed shortening of the even stria, the second being the most prolonged backwards, the tenth the least prolonged backwards (*cf.* Régimbart, 1895, *Mem. Soc. ent. Belg.* 4 : 168, fig. 4), the distinct striolation of the pronotum near the sides ; the characters of the male of *flavidus* being unknown to me, it is not possible to compare the structure of the anterior legs. *C. lewisi* is clearly closely related to *ornatipennis* Zimmerman (fig. 1*c*) by the closely comparable structure of the aedeagus and of the anterior femora of the male, but it may readily be separated by the much sparser striolation of the pronotum, which does not at all invade the middle of the disc as it does in the compared species, the reversed shortening of the even striae as mentioned above, by the nearly uniform dark brown of the elytra and by the rather less shining surface. These species seem to be unique in the remarkable denticulations of the convex ventral edge of the median lobe of the aedeagus and the serrations of the posterior edge of the ventral furrow of the anterior femora of the male.

Cybister buqueti Aubé.

Cybister buqueti Aube, 1838, *Spec. Col.* 6 : 44.
Cybister dytiscoides Sharp, 1882, *Sci. Trans. R. Dublin Soc.* 2 (ii) : 738.

Described originally from Senegal, the distribution of this species was extended to Madagascar by the description of *dytiscoides* by Sharp. Régimbart added Zanzibar as a further locality for the latter which he reduced to varietal status. I have examined the type male in Sharp's collection and I am unable to accept the name as other than a simple synonym of *buqueti*. This species seems to be remarkably rare in collections and I have seen but three other specimens. The distribution is extraordinary for so uncommon an insect, and I am unable to suggest any explanation which seems to be satisfactory. A single male specimen was sent amongst the material submitted by Abbott and is labelled Sibdu. 1945 ; this locality, Mr. Abbott informs me, is "in the plains south of Jebel Murra."

Helochares (*Hydrobaticus*) *dolus* d'Orchymont (fig. 2).

Helochares (*Hydrobaticus*) *dolus* d'Orchymont, 1939, *Bull. Ann. Soc. ent. Belg.* 79 : 319, fig. 22.

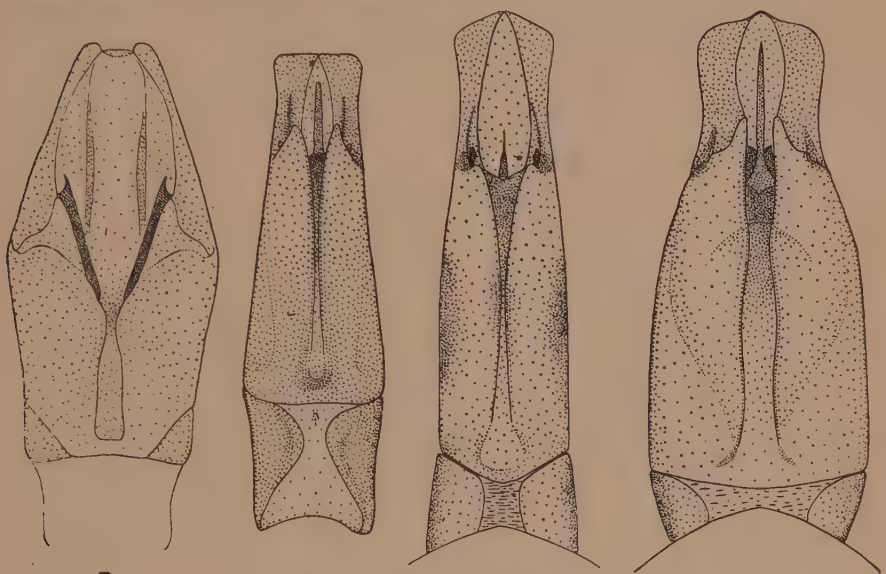
This species was described on two male specimens from Upper Senegal, Khayes and Badoumbé. It does not appear to have been

recognised from any other locality. A single male has, however, been seen from SUDAN : Nr. Gel River, 16.iii.1946, 267 H (*D. J. Lewis* coll.) which has an aedeagus exactly comparable with that figured by d'Orchymont. This provides a further example of the relationship between thefauna of the Sudan and West Africa.

Helochares (Hydrobaticus) didymoides sp. n. (fig. 3).

Extraordinarily similar to *H.* (*H.*) *didymus* d'Orchymont (fig. 4) described from Uganda and Belgian Congo, this species must, however, be regarded as distinct owing to the constant differences in the aedeagus in which the median lobe extends far up the terminal spatulate portion and the base of the spatulate portion also differs significantly as is shown in the accompanying figures.

Size : 4·85–4·92 mm. long., 2·61–2·65 mm. lat.



FIGS. 2-5—Aedeagus, dorsal aspect.

FIG. 2.—*Helochares* (*Hydrobaticus*) *dolus* d'Orch.
FIG. 3.—*Helochares* (*Hydrobaticus*) *didymoides* sp. n.
FIG. 4.—*Helochares* (*Hydrobaticus*) *didymus* d'Orch.
FIG. 5.—*Helochares* (*Hydrobaticus*) *tamsi* sp. n.

Holotype ♂, SUDAN : Didinga Mountains, Nagichot, 1,976 metres, 31.iii.1946. 267 C. (*D. J. Lewis* coll.).

Paratype ♂, same particulars as holotype.

Externally I am unable to distinguish this species from the related *didymus*, but there is no reason to doubt the specific distinction. I have also a further new species which, although not from the area under consideration, I have diagnosed below since it also belongs to this group of the subgenus characterised by the spatulate termination of the aedeagus. This new species appears to be more closely related to *didymoides* than to *didymus* by the structure of the aedeagus and is of interest in showing the West African relationships of this area to exist in the Palpicornia as in the DYTISCIDAE.

Helochares (Hydrobaticus) tamsi sp. n. (fig. 5).

As already stated, this species is very similar to *didymoides* (*supra*) in the form of the aedeagus with the median lobe extending far down the spatulate terminal portion and the occurrence of well-developed flaps at the base of the spatulate portion on the dorsal side.

Size : 5·3–5·4 mm. long. (head extended), 2·15–2·23 mm. lat. (base of pronotum).

Holotype ♂, West Africa : São Thomé Island, 4.xi.1932 (*W. H. T. Tams* coll.).
Allotype ♀, same particulars as holotype.

It is of interest to note that d'Orchymont attributes to *didymus* three West African females from "Cap Lopez" (Gaboon), "Gaboon" and "Umgebung Kamerunberg, Tiko." I am inclined to consider that these are more likely to belong to *tamsi*, which is externally indistinguishable from *didymus* and equally from *didymoides*. In the absence of males, however, it is impossible to make a definite determination.

BOOK NOTICES

Los Anofelinos de la Republica del Ecuador. Vol. I. By R. L. Castillo. Pp. 172+10 folded plates+30 pp. of photographs. 8vo. Guayaquil, Ecuador (Artes Graficas Senefelder C. A. Ltda.), 1945.

This work, which is almost entirely in Spanish, is the first volume of a proposed new series intended to cover the *Anopheles* of Ecuador.

Detailed morphological descriptions are included of various stages of ten species of *Anopheles*, followed in each case by a short English summary, and a large part of the text is devoted to general matters, such as ecology, geographical distribution, and importance of the species as malaria vectors.

There is a bibliography extending to 12 pages. The folded line plates illustrate the details of the ten species dealt with, and the photographs are mostly of typical vegetational backgrounds for *Anopheles* in Ecuador.

An insect book for the pocket. By E. Sandars. 8vo. London (Oxford University Press), 1946. Pp. 1–349, 36 pls. col., text illust. Price 12s. 6d.

Previous volumes in the Books for the Pocket series aimed at covering all the species of Birds, Flowers, Butterflies, etc., which are reasonably common in Britain. To cover the whole of the insect fauna in such a work was obviously impossible, and the author has restricted his treatment to the "larger" insects, setting his standard at half an inch or more of length, or one inch of wing span.

The work is divided into orders and sub-orders, and the main characters of each family are given, followed by a brief description of their life history and habits. Technical terms have been reduced to a minimum. The thirty-six coloured plates of the insects have been reproduced life-size.

THE SYNONYMY OF *ENALLAGMA ELONGATUM* (MARTIN) AND *E. PSEUDELONGATUM* LONGFIELD, AND THEIR DIFFERENTIATION FROM A NEW AFRICAN SPECIES (ORDER ODONATA)

By Lt.-Col. F. C. Fraser, I.M.S., Retd., F.R.E.S.

Specialists dealing with the order Odonata have been accustomed to select their types from specimens of the male sex, because in them specialisation has attained a higher level than in the females and thus more characters are available for differentiation. Nevertheless it is found convenient at times to select types from among the females either because the new species are known only from that sex or because, contrary to the common rule, these particular females happen to be more highly specialised than the males. On the whole, though, this latter course is open to objection and has led on occasions to great confusion in classification.

A case in point is furnished by the African species *Enallagma elongatum* (Martin), which was described rather inadequately by its author from a single female, which he placed in the genus *Ischnura*. The females of the Enallagmas are extremely similar in general facies, so that unless taken *in cop.*, or in a long series in one locality, it is very difficult and often impossible to determine the respective males. This possibility should have been evident to Martin, and one can only assume that he took the course of describing a new species from this female because it happened to be the first of its kind discovered which possessed a more than usually elongated abdomen. Unfortunately, other species were discovered later which possessed just the same peculiarity.

In the year 1909, Sjöstedt described what he thought to be the unknown male of *E. elongatum* from specimens received from Kilimanjaro which agreed with this species in possessing an elongate slender abdomen. He had never seen the type female in the Muséum National d'Histoire Naturelle, Paris, but he had both sexes, and the female appeared to agree with Martin's description.

In 1921 Dr. Ris described both sexes of what he thought to be Martin's *Ischnura elongatum*, but which he correctly referred to the genus *Enallagma*. He had before him four males from British East Africa and a single female which he had borrowed from Sjöstedt but which, he says, was sent to him bearing a name other than *elongatum*. He too had never seen the type female in Paris and based his determinations on Sjöstedt's descriptions of the two sexes. He associated the female with the four males chiefly because they came from the same geographical region. In the same paper he described a new species, *Enallagma fractum*, with abdomen approximately of the same length as in *elongatum*.

Finally, in the year 1936, Miss Longfield pointed out that Ris had attributed the wrong male to *elongatum*, showed that the species described by him was new to science, and named it *pseude-*

longatum. She had seen two males of *elongatum* from Nairobi and had no hesitation in naming them from the description by Sjöstedt. It is curious that none of these three authors had seen the type and that Sjöstedt alone had based his determination on the original description by Martin : fortunately, however, as the sequel shows, Sjöstedt was correct in his determination, so that Miss Longfield, by a comparison of his and Dr. Ris's respective descriptions of the supposed male, was able to supply the correct solution.

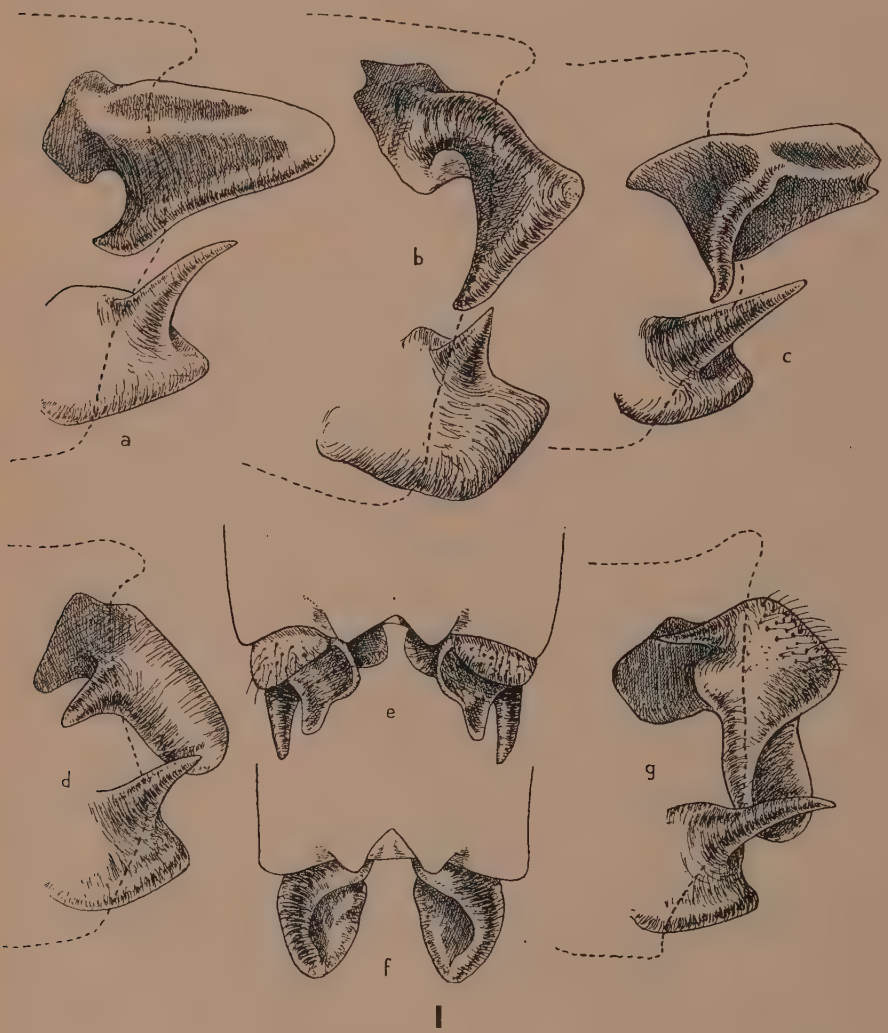


FIG. 1.—Anal appendages viewed from the left side in *a*, *b*, *c*, *d* and *g*, and from above in *e* and *f*. The dotted outline shows the apical end of the 10th abdominal segment partially covering the appendages. *a*, *Enallagma subtile* Ris ; *b*, *E. longfieldæ* sp. n. ; *c*, *E. subfurcatum* Selys ; *d*, *E. pseudelongatum* Longfield ; *e*, *E. elongatum* (Martin) ; *f*, *E. longfieldæ* sp. n. ; *g*, *E. elongatum* (Martin).

Shortly after the publication of Miss Longfield's paper, Mr. Kenneth Morton wrote to me on the subject of the African Enallagmas : he was not satisfied, he said, that the synonymy had been correctly cleared up. He sent me a number of duplicates, among which were specimens of *pseudelongatum* and another unnamed species which he thought might lay claim to be the male of Martin's *elongatum*. Our correspondence petered out just at the outbreak of war and we had come to no satisfactory conclusions except that we had also added Ris's *E. fractum* to the list of candidates for the hand of *elongatum*. Some three months ago I took out this old correspondence, which was docketed with a large number of notes, figures of appendages and coloured sketches of African Enallagmas, and decided to try and clear up the obscurity which appeared still to reign around *elongatum*. I wrote to Drs. Paulian and Sjöstedt of the Paris and Stockholm Museums for a loan of the types and, thanks to their assistance and the loyal co-operation of the two Museums, I duly received a loan of Martin's female type and Sjöstedt's male allotype, with the aid of which I have now been able to clear up the identity of *elongatum* Martin, *elongatum* Sjöstedt, *elongatum* Ris, *pseudelongatum* Longfield, and Morton's unnamed species, as well as, incidentally, Ris's *fractum*.

Recently I have been able to examine one of the original specimens of *fractum* taken by Sir Guy Marshall in Mashonaland and employed by Ris for his description of the species : this specimen was lent from the Williamson collection, Ann Arbor, and was brought to my notice through the kindness of Miss Longfield, who had already formed a quite independent opinion that this species was *elongatum* Martin. Among the material sent me by Morton are a few specimens from Abyssinia, Djem-Djem Forest, 29.ix.26, 8,000 to 9,000 feet. (coll. *Hugh Scott*) : these differ slightly in their colour and markings, but the anal appendages are exactly similar to those of *fractum*, so that the range of *elongatum* is extended considerably and further stress is laid on the altitude at which it occurs.

During the course of this investigation I found that important features of the anal appendages are often concealed beneath the overhanging borders of the 10th abdominal segment : thus in the common *subfurcatum* Selys a robust ventral basal spine is present which has been overlooked by all authors who have dealt with it save Sjöstedt, who also mentions the difficulty met with in examining the appendages on account of their cryptic character. To overcome this, it is essential to remove at least one of the superior appendages and examine it from all aspects. Ris shows the ventral spine in *pseudelongatum*, but it is not shown in the figure given by Miss Longfield : Ris shows *subtile* without any such spine, but I find on removing one of the superior appendages that it ends basally and ventrally in a very robust spine : probably most species have a similar organ. Sjöstedt does not mention the presence of a spine in his *abyssenicum* although he mentions one in *subfurcatum*, otherwise I can find no difference between these two species. If therefore the former should be found to possess a similar spine to the latter, there can be no doubt about the synonymy. I have figured some of these

species again, showing the appendages and an outline of the overlapping 10th segment by which it will be appreciated how much of the appendages is apt to be concealed : as these same appendages furnish our chief means for differentiating the species, the importance of removing them for examination cannot be exaggerated.

Synonymy Involved.

Enallagma elongatum (Martin).

Ischnura elongatum Martin, 1906, *Bull. Mus. nat. Hist. Paris* **12** : 513 (Type ♀).

Ischnura elongatum Sjöstedt, 1909, *Kilimandjaro-Meru. Exp.* **2** (*Pseudoneurop.* 14) : 42 (Allotype ♂ described and ♀ redescribed).

Enallagma fractum Ris, 1921, *Ann. S. Afr. Mus.* **18** : 329 (♂ and ♀ described).

Enallagma elongatum Longfield, 1936, *Trans. R. ent. Soc. Lond.* **85** : 474 (*E. elongatum* and *pseudelongatum* compared).

Enallagma pseudelongatum Longfield.

Enallagma elongatum Ris, 1921, *Ann. S. Afr. Mus.* **18** : 324 (♂ described).

Enallagma pseudelongatum Longfield, 1936, *Trans. R. ent. Soc. Lond.* **85** : 474 (♂ and ♀ described).

Enallagma longfieldæ sp. n. (figs. 1, *b* and *f*, 2, *a*).

Male. Abdomen 30 mm. Hind-wing 20·5 mm.

Head : Labium straw coloured, labrum azure blue, epistome black, frons azure blue as also small postocular spots which are connected by a narrow convex stripe of the same colour across the occiput : rest of head black, this including a very broad stripe across the vertex running from eye to eye. Eyes probably dark marine blue during life. Prothorax black on dorsum, broadly azure blue laterally as also a small oval spot on mid-dorsum of middle lobe which is finely divided longitudinally with black. Thorax azure blue laterally, broadly black on dorsum which is traversed by rather broad antehumeral stripes, but these rather narrower than the humeral black. A short upper spot of black on the postero-lateral suture. Legs bluish at base, pale greenish-yellow thereafter, the femora and tibiae broadly black on flexor surfaces. Wings hyaline ; nodal index $\frac{11-11}{10-10}$; pterostigma black finely framed in white, covering one cell, diamond-shaped, that of fore-wing considerably larger than that of hind-wing ; *ac* nearest the proximal antenodal. Abdomen bluish at base changing to greenish-yellow at apical end of segment 3 and again to blue on segments 8 to 10 ; segment 1 with a squarish black dorsal spot extending whole length of segment ; segment 2 with a rather narrow stripe shaped like the head of a thistle with its stalk at apical border where it is confluent with a narrow apical black ring ; segments 3 to 6 with the conventional black dorsal stripes broadening apically and confluent there with narrow apical black rings ; segment 7 broadly black, this overlapping the sides but tapering basally ; segment 8 with a broad saddle-shaped dorsal black spot deeply bifid apically and covering the basal three-fourths of the segment ; segment 9 entirely blue, 10 with only two small blue dorsal round spots and the lower parts of the sides of the same colour. Anal appendages black ; superiors largely hidden by the overlapping 10th abdominal segment, shaped like the head of a goose with the beak inclining downwards (fig. 1, *b*) ; inferiors of the same length and of the shape usually found in the African Enallagmas, the spine much abbreviated and directed strongly upwards and slightly backwards.

Female. Abdomen 30·5 mm. Hind-wing 22 mm.

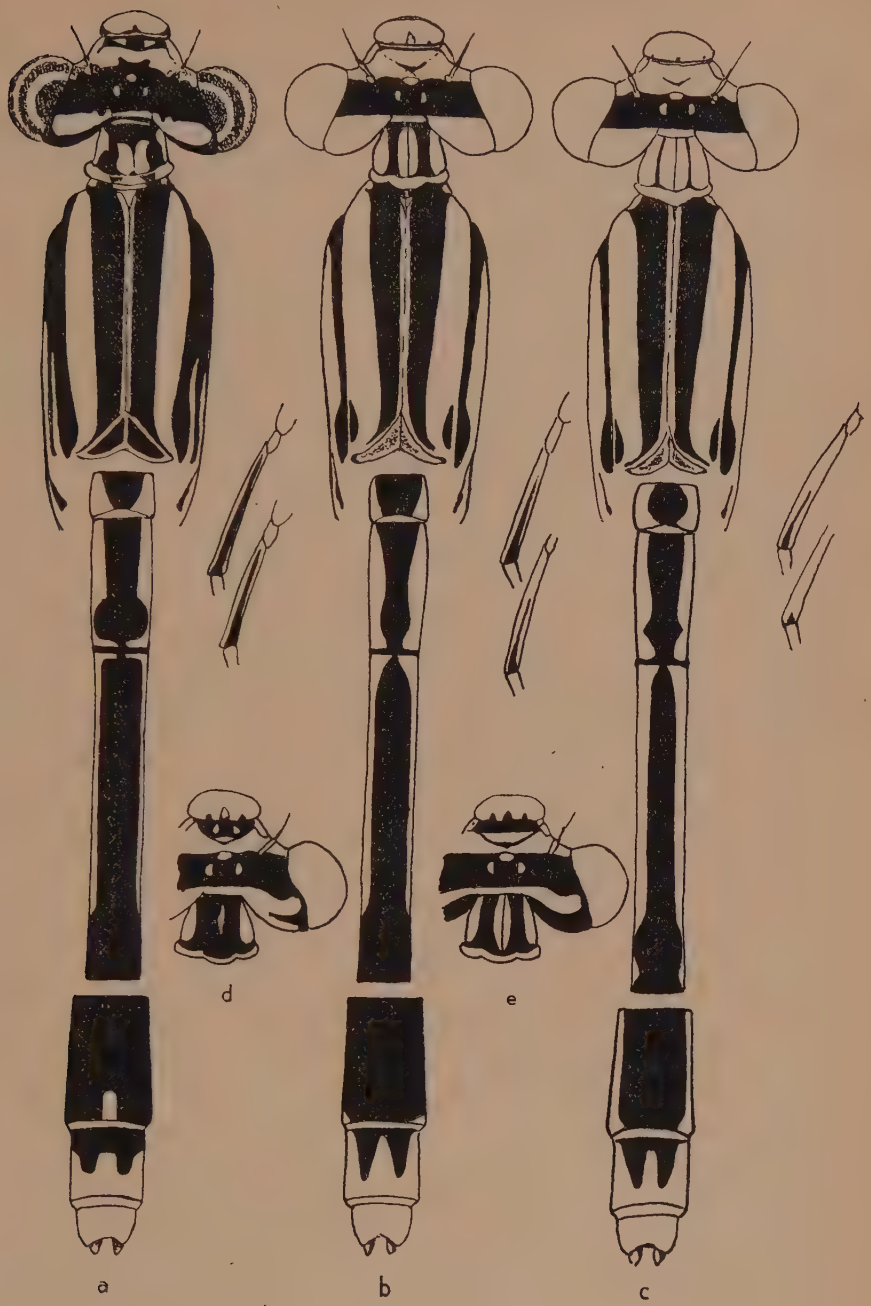


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FIG. 2.—*a*, Female of *Enallagma longfieldæ* sp. n.; middle and hind-legs inset to the right; *b*, female of *E. elongatum* (Martin), from the type in the Paris Museum; *c*, female of *E. elongatum* (Martin), from Sjöstedt's type in the Rijks Museum, Stockholm; *d*, head of *E. elongatum* (Martin), from an Abyssinian specimen in the Morton collection; *e*, the same from an Uganda specimen in the Fraser collection which is similar to the allotype male in the Rijks Museum.

Head : labrum blue, its base narrowly black : epistome black marked with two small triangular ochreous spots at its middle ; frons olivaceous as also the stripe connecting the postocular spots which are much paler blue than in the male : rest of head black. Eyes olivaceous capped with pale brown and two equatorial stripes of the same colour (fig. 2, *a*). Antennae black but the 3rd segment ringed with yellow at its middle. Prothorax and thorax similar to the male, but the ground colour olivaceous paling to greenish-yellow laterally ; dorsal markings on prothorax restricted and the mid-dorsal oval spot proportionately larger ; mid-dorsal carina of thorax bright ochreous, as also is a narrow outward bordering of the antehumeral stripes. Legs yellowish, the black stripes narrower than in the male. Wings evenly and palely enfumed ; venational details similar to those of the male ; pterostigma honey coloured. Abdomen greenish-yellow laterally, bright ochreous on middorsum but the black largely obscuring it here ; the black dorsal stripes much broader than in the male and the dorsal marking on segment 2 not expanded basally ; that on segment 7 not extending to base of segment, which is broadly pale ; segment 8 entirely black save for a minute bluish apical mid-dorsal spot ; segments 9 and 10 azure blue, the former with a broad dorsal black marking covering about the basal two-thirds and deeply bifid apically. Anal appendages shortly conical, blue.

Habitat : E. Africa, Uganda, western shores of L. Victoria, vii.–ix.27, 1 male and 2 females (coll. *G. D. Hale Carpenter*) ; Kenya, M'Gori R., Suna, S. Kavirondo, 6.viii.31, 2 males in Fraser collection, co-types in Morton collection. The male *type* and *allotype* female will be eventually deposited in the British Museum (Natural History). This new species differs from all others of the genus by the shape of its anal appendages which serve easily to differentiate it : the female may be determined by the spotted epistome, the banded eyes, which are foreign to this genus but common in Platycnemidae, and lastly by the shape, of the dorsal marking on segment 2.

THREE NEW SPECIES OF COCCOIDEA (HEMIPTERA HOMOPTERA) FROM THE GOLD COAST, BRITISH WEST AFRICA

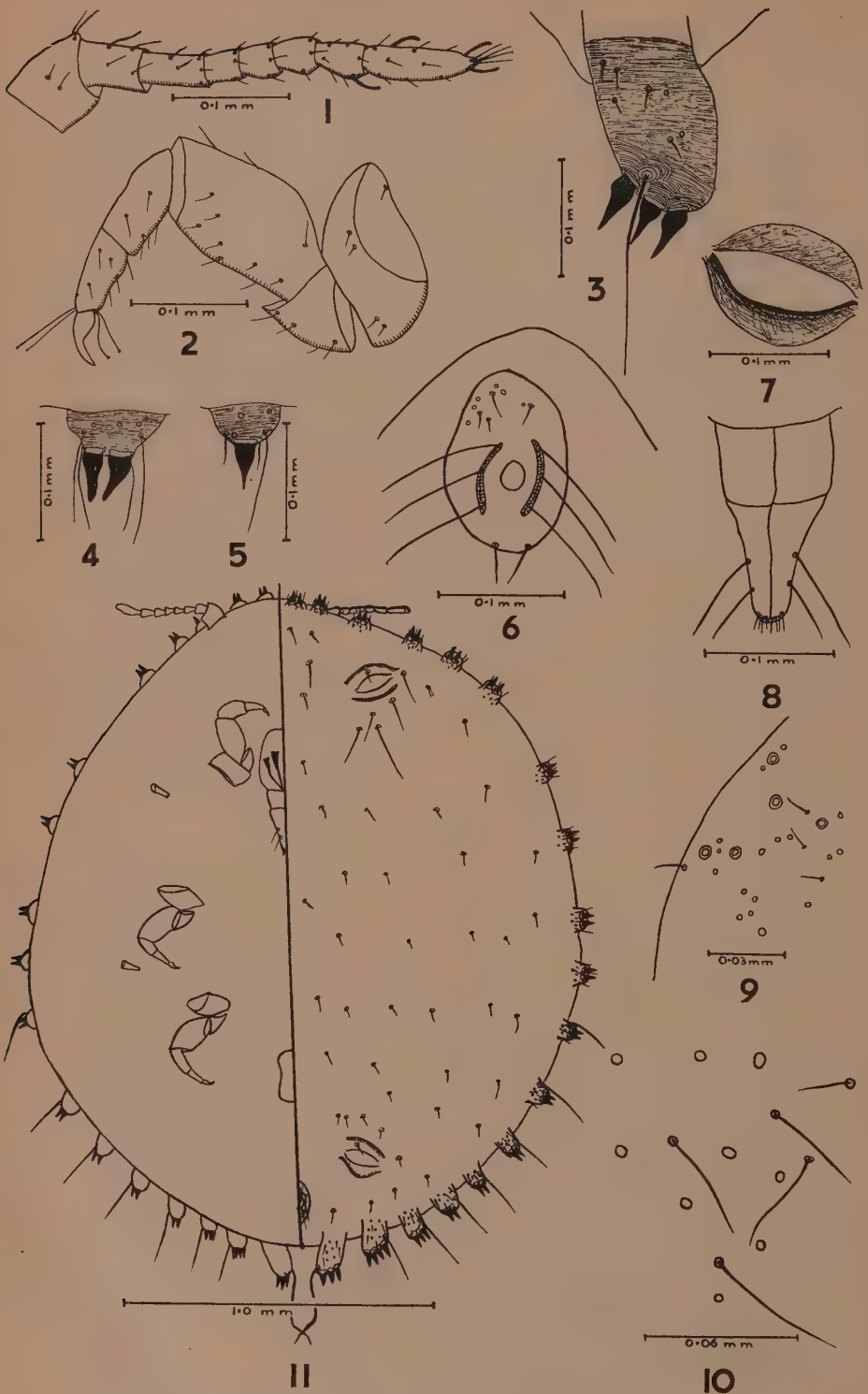
By A. H. Strickland, M.A., F.R.E.S.

The three species of mealybugs described below were all collected from indigenous trees growing amongst the 900 acres of cacao on the lands taken over by the West African Cacao Research Institute, at Tafo, Eastern Province, Gold Coast Colony, for experimental purposes.

Two of the species have been assigned to the genus *Tylococcus* Newstead (1897, *Ent. mon. Mag.* **33** : 165–66). The third species has been assigned to *Pseudococcus* Westwood, though, as will be seen from the description and figures, it is quite close in many respects to the second species, *Tylococcus boafoensis*. In this connection it should be pointed out that the genus *Tylococcus* is badly in need of revision, and that, when a revision is made, it is possible that several of the existing species, plus the new *T. boafoensis*, may be relegated to *Pseudococcus*.

Tylococcus malacanthae sp. n. (fig. 1).

Adult Female. Broadly ovate, narrower anteriorly than posteriorly. Anterior segments lightly powdered with a fine, dusty, yellow wax, the posterior segments nude of wax. With eighteen pairs of groups of thin, glassy, yellow wax filaments laterally, each group consisting of two or three individual filaments issuing from a cerarius. Body colour, when wax removed, ochreous yellow. First instar larvae lemon yellow in colour, without wax covering, but with one pair of wax tassels anally. Antennae : eight-jointed, of the normal Pseudococcine type. Basal joint as broad as long, with a pair of sub-apical setae, and one or two setae scattered medially. 2nd joint rather longer than broad, with median and sub-apical rings of two or three setae. 3rd joint same length as 2nd, with two rings of setae. 4th joint short, about half length of second, and as long as broad, with one ring of setae sub-apically placed. 5th joint slightly longer than 4th, with one sub-apical ring of setae. 6th joint same length as 5th, with one sub-apical ring of setae. 7th joint same length as 3rd, with median and sub-apical rings of setae, and one blunt, curved, sub-apical spine. 8th joint twice as long as 2nd, with basal, median and sub-apical rings of setae, and three blunt spines, one medially and two sub-apically placed, and a tuft of three or four long setae at the apex. Relative measurements of the joints, in microns : 1, ·46 ; 2, ·45 ; 3, ·43 ; 4, ·26 ; 5, ·30 ; 6, ·32 ; 7, ·42 ; 8, ·88 (Fig. 1 (1)). Legs (described from right hind leg) : very short and stout. Coxa : twice as broad as long, with a few setae along the integumental edge and medially. (Hind coxae with numerous translucent pores medially.) Trochanter : with one pair of long setae on the distal corner, and three or four grouped irregularly on the leading edge. Femur : short and stout, two-thirds as broad as long, with numerous (about ten) long, thin setae in three rather indistinct rows, one on either edge, and one medially. Tibia : short and stout, two-thirds as broad as long, with three rows of setae, those on the inner edge being slightly longer than the others. Tarsus : twice as long as broad, with four or five setae on the inner edge, and the usual two other rows. Tarsal digitules : slightly longer than tarsus, with minute oval terminal knobs. Claw : two-thirds length of tarsus, gently curved, and sharply pointed. Ungual digitules : slightly longer than claw, with almost circular knobs at ends. Relative measurements of the joints, in microns, are given in Table 1 below.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0·03 mm
9
0·06 mm
10
1·0 mm
11

TABLE 1.

	Coxa	*Femur*	*Tibia*	*Tarsus*	*Claw*
Leg : 1	58	152	76	58	38
Leg : 2	57	144	73	59	38
Leg : 3	59	148	81	65	38

The third pair of legs is a little longer than the other two pairs (Fig. 1 (2)). Cerarii : eighteen pairs, all on conspicuously raised, sclerotised tubercles (one specimen only had seventeen pairs), the anal tubercles largest (114 by 81 microns), the others decreasing in size from the anal pair forwards, down to the eighth pair, when size fairly uniform down to the inter-antennal pair. Each of the eight posterior tubercles with one long and a few short setae, the anal pair with longer long setae than the others. The anterior pairs without long setae, but with three or four ordinary short setae. All tubercles with three or four small trilocular pores intermingled with the setae. Spines large, robust, broad at base, and of a more or less uniform width for the first third, then tapering rapidly to a sharp point. The spines on seven specimens were counted, and gave the following results : Inter-antennal, 1, ·2 ; 2, ·2 ; 3, ·1 (two of the specimens had two spines) ; 4, ·2 (one specimen with only one spine) ; 5, and all pairs up to the 14th, ·2 ; 15, ·3 ; 16, ·3 ; 17, ·4 ; 18, ·3 (Fig. 1 (3, 4 and 5)). Anal region : ring with six long, sharply pointed setae, and two rows of pores, the inner row being ovoid, and perfectly arranged in a line, the outer row irregular (Fig. 1 (6)). Dorsal osteoles large, with strongly sclerotised lips, usually bearing one short seta only on the anterior lip. No other pores or setae observed on the osteolar lips (Fig. 1 (7)). Eyes : small, circular, like an inverted saucer. Spiracles : small, elongate, and twice as broad at the mouth as at the base. Beak : two-jointed, triangular, second joint tapering to a fine point, with groups of two or three fine setae at tip on either side, and two pairs of long setae sub-medially on the terminal joint. Length : 203 microns (Fig. 1 (8)). Derm : with spores of two types—small trilocular and larger circular pores —scattered more or less uniformly over the dorsal and ventral surfaces. Both types, especially the larger, are more numerous on the dorsum. In addition to these two types, there are clusters of larger circular multilocular disc pores ventrally on the posterior abdominal segments. One translucent, dumb-bell shaped circulus on the mid-venter. A few long setae laterally, grouped close to the cerarian tubercles, and also to be found occasionally on the dorsum. The commonest dorsal, and nearly all the ventral, setae are markedly shorter than these long ones.

Length 2·2 mm. ; breadth 1·2 mm. (Fig. 1 (9, 10, and 11)).

Type locality : Gold Coast : Tafo, Eastern Province.

Type host : *Malacantha sp.* (Sapotaceae). (*Coll.* : *E. O. Boafo.*)

Material examined : Eight adult females. The type has been deposited in the Coccid collection of the British Museum (Natural History).

This species has been compared with the genotype, *T. madagascariensis* Newstead, the type of which is in the British Museum, and there can be no doubt as to its congeneric nature. It differs in having larger and more robust cerarian tubercles (those in *madagascariensis* are little, if any, longer than wide), in having much larger and more conspicuous spines, and in the number of tubercles present.

Tylococcus boafoensis sp. n.

Adult Female. Elongate oval in shape, covered with white wax, thinner along the intersegmental membranes and around the beak and coxae, without a dorsal wax-free stripe.

Fig. 1.—*Tylococcus malacanthae.*

1, Antenna. 2, Leg. 3, Anal cerarian tubercle. 4, 12th cerarian tubercle. 5, Inter-antennal cerarian tubercle. 6, Anal ring. 7, Dorsal osteole. 8, Beak. 9, Ventral derm in genital region. 10, Dorsal derm posterior to antennae. 11, Adult female.

With eighteen pairs of lateral wax filaments, the anal pair longer than the rest. Body colour, when wax removed, light yellow. Antennae : Eight-jointed, of the normal Pseudococcine type. Basal joint as long as broad, with a few setae on the apical edge. 2nd joint longer than broad, with a sub-apical ring of three or four setae. 3rd joint rather shorter than 2nd, with sub-apical setal ring. 4th joint shortest, often only half as long as second, with sub-apical setal ring. 5th joint shorter than 3rd, with sub-apical setal ring. 6th joint same length as 5th, with subapical setal ring. 7th joint same length as 3rd, with sub-apical setal ring, and one sub-apical curved, blunt spine. 8th joint equal in length to twice the 2nd joint, with medium and sub-apical setal rings, a tuft of one long and two or three shorter setae at the apex, and one median and two sub-apical spines. Relative lengths of the joints, in microns, are : 1, ·40 ; 2, ·41 ; 3, ·33 ; 4, ·22 ; 5, ·27 ; 6, ·27 ; 7, ·32 ; 8, ·80 (Fig. 2 (1)). Legs (right hind leg)—Coxa : somewhat broader than long, with a few setae on the distal edge. Trochanter : with one pair of long setae on the distal corner, and one or two others on the proximal corner. Femur : nearly half as broad as long, with not more than eight to ten setae irregularly placed on surface. Tibia : five to six times as long as broad, with two rows of four or five setae along the edges, and a few medially placed. Tarsus : two-thirds length of tibia, with the usual three rows of setae. Tarsal digitules : equal in length to two-thirds tarsus, very fine and thin, with delicately knobbed ends. Claw : less than half length of tarsus, gently curved at base, sharply at tip. Ungual digitules: same length as claw, ending in blunt knobs. Relative measurements, in microns, of the joints given in Table 2, below.

TABLE 2

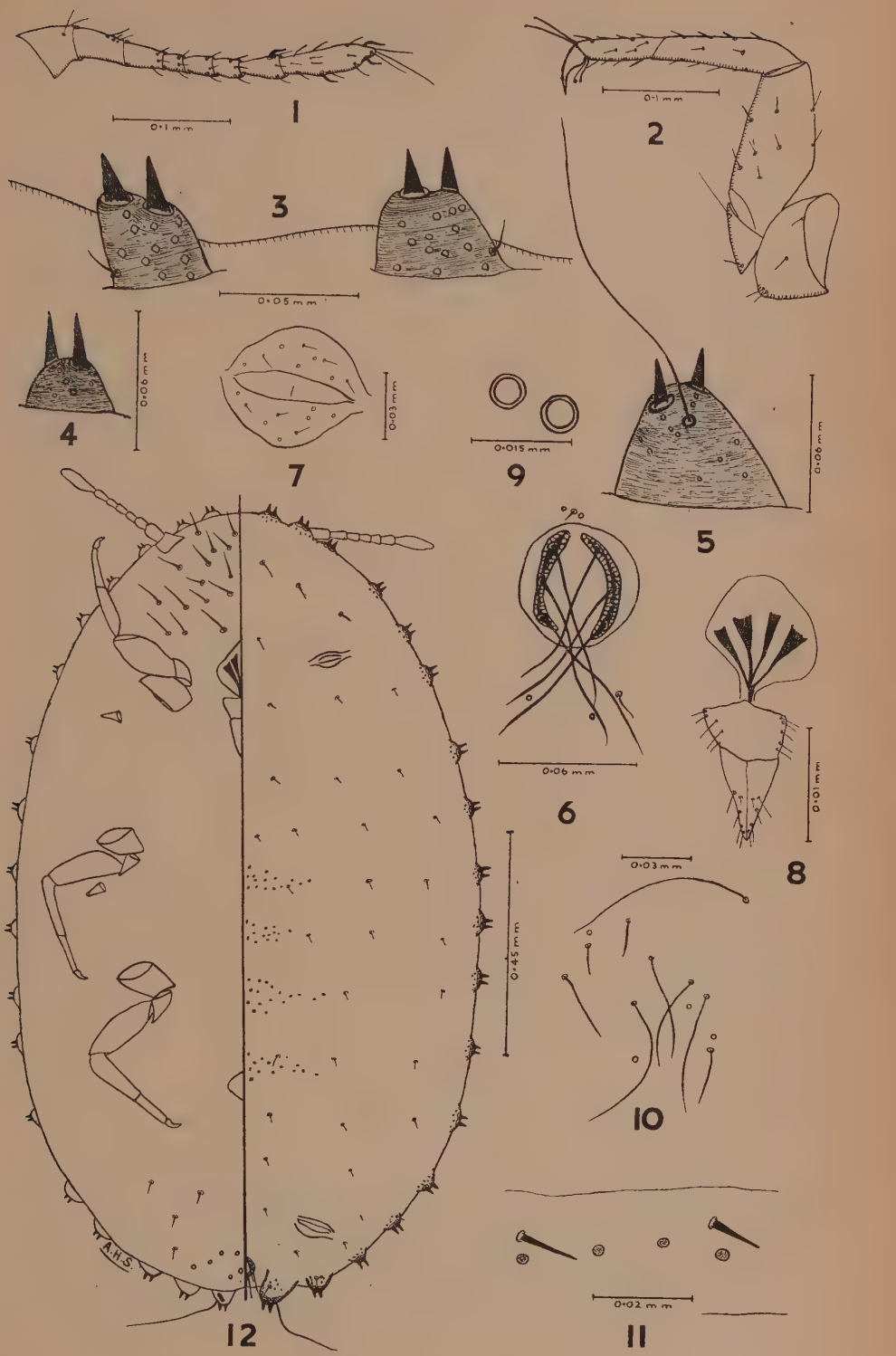
	Coxa	*Femur*	*Tibia*	*Tarsus*	*Claw*
Leg : 1	49	144	114	76	35
Leg : 2	53	152	122	80	35
Leg : 3	53	167	144	84	35

The third pair of legs are slightly, but consistently, longer than the other two pairs (Fig. 2 (2)). Cerarii : usually eighteen pairs, occasionally only seventeen pairs, or seventeen on one side and eighteen on the other. All with two spines and a few pores raised on small, sclerotised, tuberculate papillae of a type rather different from those in *T. malacanthae*. Anal papillae largest, broader than long (223 microns long by 247 broad), with a slender, rectangular, sclerotised plate on the ventral aspect. Then decreasing in size for the next three pairs, then of a more or less uniform size down to the inter-antennal pair. Anal pair with one long and a few short setae, all others with only one or two, or without any, short setae (Fig. 2 (3, 4 and 5)). Anal region : ring with six long setae, about half as long as the long setae on the anal cerarii, and with two rows of pores, the outer row irregular, the inner row more regular in arrangement (Fig. 2 (6)). Dorsal osteoles with lightly sclerotised lips, and bearing four or five pores and three or four setae on each lip (Fig. 2 (7)). Eyes : large and conspicuous, about the same size as the fourth antennal joint. Spiracles : medium sized, twice as broad at orifice as at base. Beak : two-jointed, with a tuft of setae on the apex and three or four median to sub-apical setae on each half of the second joint, and five setae along each edge of the first joint (Fig. 2 (8)). Derm : with trilocular pores dorsally interspersed with a few short spines, with thread-like tips, and very few short setae. Ventrally, pores very sparse, and spines absent. One oval circulus present. A few short setae present posteriorly, and a cluster of longer (two or three times as long) setae anterior to the first pair of legs. A few large multilocular pores (about twelve) in the genital region (Fig. 2 (9, 10 and 11)).

Length 1·7 mm. ; breadth 0·9 mm. (Fig. 2 (12)).

FIG. 2.—*Tylococcus boafoensis.*

1, Antenna. 2, Leg. 3, 13th and 14th cerarian tubercles. 4, Inter-antennal cerarian tubercle. 5, Anal cerarian tubercle. 6, Anal ring. 7, Dorsal osteole. 8, Beak. 9, Derm pores from genital region. 10, Ventral derm anterior to front legs. 11, Dorsum, showing dermal spines and pores. 12, Adult female.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11
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12
0·45 mm
A.H.S.

Type locality: Gold Coast: Tafo, Eastern Province.
Type host: *Musanga smithii* (Moraceae). (*Coll.*: *E. O. Boafo*, to whom this species is dedicated.)

Material examined: Twelve adult females, and a number of unmounted adults and nymphs. Type slide deposited in the British Museum.

This species is probably more closely related to *T. mauritiensis* Mamet than to the other members of the genus. It differs from *T. mauritiensis* in having much more robust limbs, in the sclerotisation of a sharply defined area surrounding the cerarii, and in the very much smaller number of multilocular disc pores on the ventral surfaces of the posterior abdominal segments.

Pseudococcus celtis sp. n.

Adult Female. Oval to sub-circular in shape, completely covered dorsally and ventrally with white wax, thinner along the intersegmental membranes, and ventrally, especially around the beak and coxae. With seventeen or eighteen pairs of stout lateral wax filaments, the anal pair being slightly longer than the abdominal pairs, and these longer than those anteriorly placed. No dorsal median wax-free stripe. Body colour, when wax removed, a dull lemon yellow. Antennae: Eight-jointed, of the normal Pseudococcine type. Basal joint as long as broad, with two or three sub-apical setae on the inner corner. 2nd joint half as wide as long, with a sub-apical ring of setae. 3rd joint a little shorter than second, with a sub-apical ring of setae. 4th joint half as long as second, with sub-apical setal ring. 5th joint a little longer than 4th, with sub-apical setal ring. 6th joint same length as 5th, with sub-apical setal ring. 7th joint a little shorter than 3rd, with sub-apical setal ring, and one curved, blunt spine sub-apically placed. 8th joint nearly twice length of 3rd, with median and sub-apical rings of setae, a tuft of three or four setae at the tip, and three blunt spines, one median, and two sub-apically placed. One of the specimens examined had the 7th and 8th joints fused together. Relative measurements of the joints, in microns: 1, ·46; 2, ·44; 3, ·41; 4, ·23; 5, ·30; 6, ·28; 7, ·34; 8, ·76 (Fig. 3 (1)). Legs (right hind leg)—Coxa: twice as broad as long, with two sharp setae on the integumental edge, and two or three on the distal edge and medially. Trochanter: with one pair of long setae on the distal edge, and two or three scattered medially. Femur: more than twice as long as broad, with four irregular rows of three or four setae each. Tibia: one-third as broad as long, with three rows of two or three setae each. Tarsus: gently tapering to claw. Median width one-third length, with three rows of two or three setae each. Tarsal digitules: three-quarters as long as tarsus, with fine, rounded, knobbed ends. Claw: sharp, robust, less than half as long as tarsus. Ungual digitules as long as claw, with flattened, roughly triangular plates at the ends. The coxae and tibiae of the hind pair of legs always with numerous translucent pores, most conspicuous on coxae, and apparently absent on femora and tarsi. Relative lengths of the joints, in microns, are given in Table 3, below.

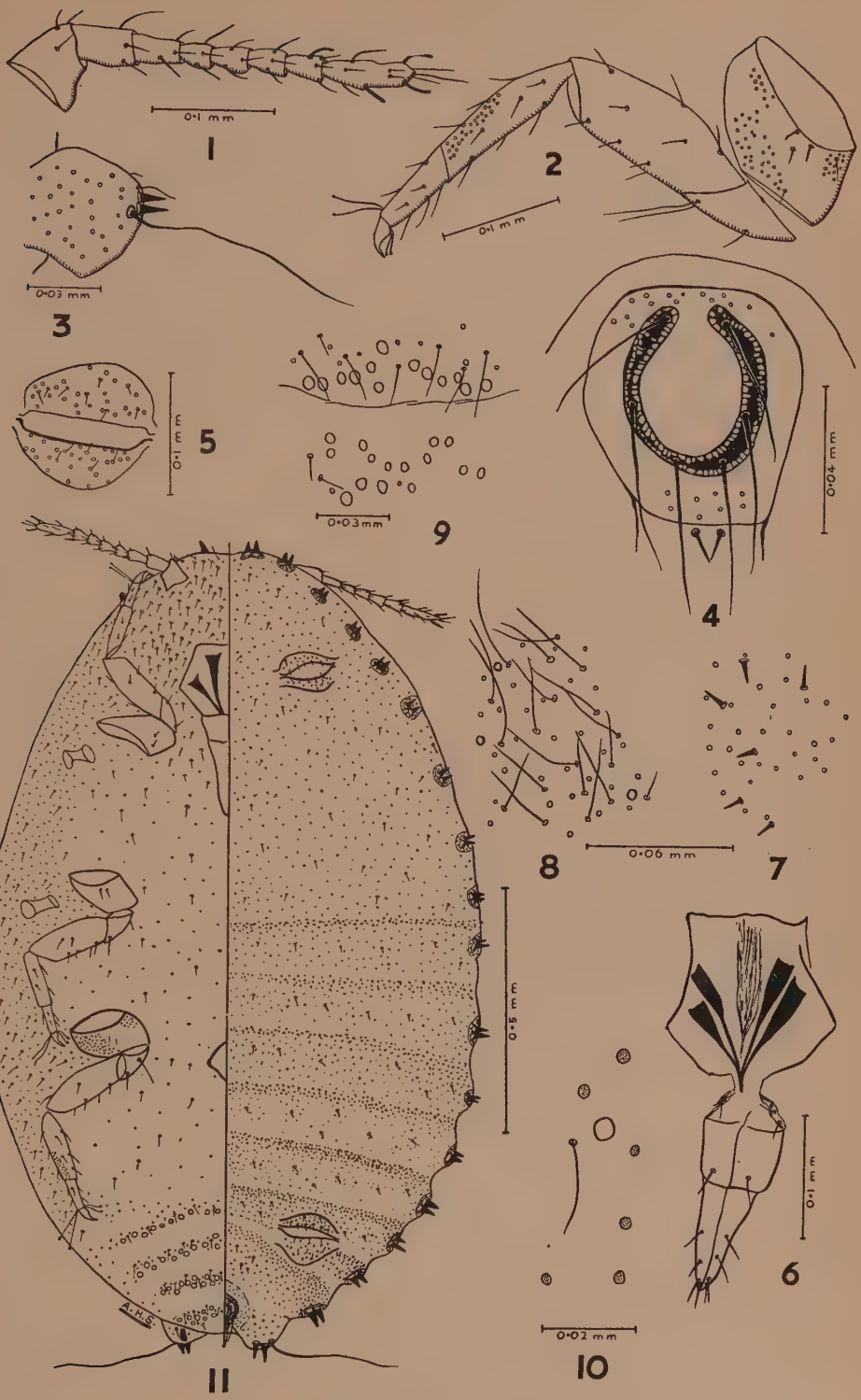
TABLE 3.

	Coxa	*Femur*	*Tibia*	*Tarsus*	*Claw*
Leg: 1	55	147	93	67	37
Leg: 2	61	152	103	71	27
Leg: 3	71	169	122	76	27

The third pair of legs is consistently longer than the other two pairs (Fig. 3 (2)). Cerarii: eighteen pairs, each with two long, narrow, sharply pointed spines (third pair of

Fig. 3.—*Pseudococcus celtis.*

1, Antenna. 2, Leg. 3, Anal cerarius. 4, Anal ring. 5, Dorsal osteole. 6, Beak. 7, Middorsum, showing dermal spines and pores. 8, Venter, anterior to front legs. 9, Venter, showing pores in genital region. 10, Anterior dorsum. 11, Adult female.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0·1 mm
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0·04 mm
4
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5
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9
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8
7
0·5 mm
A.H.S.
11
0·1 mm
6
0·02 mm
10

cerarii often with three, or even four spines), a cluster of circular to triangular pores, and a few setae. Anal pair with one long seta (length 266 microns), all others with short setae only (Fig. 3 (3)). Anal region: ring with six long setae, about half as long as those on the anal cerarii, and two rows of pores (Fig. 3 (4)). Dorsal osteoles: conspicuous, with strongly sclerotised lips clustered with pores, short, sharp spines, and a few short setae (Fig. 3 (5)). Eyes: small, slightly longer than broad, "thumb-like." Spiracles: large and conspicuous. Beak: dimerous, with a cluster of two pairs of two setae on the terminal segment, one pair apical, the other median, and a cluster of two pairs of setae at the tip. One pair of setae distally on the first joint. Measurements, in microns, 144 by 84 (Fig. 3 (6)). Derm: with the usual tri- and multilocular pores scattered over the body, less commonly on the mid venter. With clusters of relatively thick lipped circular pores clustered in rows in the genital region on the venter. There are four rows of these pores, one on each of the four terminal segments. A count of the available material gave the following numbers: Most anterior—1, ·20; 2, ·22; 3, ·22; 4, ·16. Dorsum with short, sharp spines, intermingled with the pores, and a few hair-like setae. Ventrally, spines absent, but setae common, especially laterally. Anteriorly and ventrally, in front of the first pair of legs, there is a cluster of long (twice as long as the average body setae) setae. One irregularly oval ventral circulus present.

Length 1·6 mm.; breadth 1·2 mm. (Fig. 3 (7, 8, 9, 10 and 11)).

Type locality: Gold Coast: Tafo, Eastern Province.

Type host: *Celtis sp.* (Urticaceae). (*Coll.*: *E. O. Boafo.*)

Material examined: Ten adult and six unmounted young adult females. The type has been deposited in the British Museum.

This species would seem to be a member of the group of which *Ps. citri* Risso is the central species. It differs in having relatively shorter and more robust limbs, and in having the sharply pointed, slender spines on the dorsum. It is possible that this species has been described before. It does not appear to be in the British Museum Coccid collection, and work in connection with the Pseudococcine vectors of West African cacao viruses renders its identity a matter of some importance. To prevent future confusion, the type slides have been deposited in the British Museum (Natural History), and paratypes are in the West African Cacao Research Institution collection, and in the writer's personal collection.

The writer wishes herewith to acknowledge the valuable advice and assistance rendered him in the course of this work by Dr. W. J. Hall, Director of the Imperial Institute of Entomology, and his thanks to Mr. F. Laing for allowing him to examine certain species in the British Museum Coccid collection. Thanks are also due to the Director, West African Cacao Research Institute, for permission to publish this paper.

INDEX

abyssenicum, *Enallagma*, 145
aberrans, *Conosoma separatum* **var. n.**, 116
ACANTHOSOMINAE, 27
achaemenes, *Charaxes*, 53
aconitus, *Anopheles*, 87
ACRIDIDAE, 10, 24
Acytolepis, 7
Adenophlebia auriculata, 124, 125
Adenophlebia sylvatica, 125
adima, *Petrelaea dana*, 4, 7
Aëdes Dunnius) *albomarginatus*, 132
Aëdes (*Dunnius*) *kummi*, 132
Aëdes (*Finlaya*) *embuensis*, 130
Aëdes (*Finlaya*) *ingrami*, 129, 131
Aëdes (*Finlaya*) *wellmani*, 129
Aëdes kermorganti, 86, 87
Aëdes (*Stegomyia*) *contiguus*, 131
Aëdes (*Stegomyia*) *soleatus*, 131, 132
aegyptius, *Atrichopogon*, 69, 72, 73, 74
aeneum, *Cloëon*, 124
aetolica, *Forficula*, 65
africanum, *Austrocloëon*, 124
africanus, *Atrichopogon*, 72, 73
Afronurus, 126
Afronurus peringueyi, 126
aglaodesma, *Cosmoclostis*, 42, 43, 44, 46, 48, 49
aglaodesma, *Cosmoclostis aglaodesma*, 42
albomarginatus, *Aëdes* (*Dunnius*), 132
alienum, *Conosoma*, **sp. n.**, 117
alienus, *Pseudomyrmedon*, **sp. n.**, 118, 119
alticola, *Alticolana*, 23
Alticolana, 24
Alticolana alticola, 23
Alluaudyomia, 69
Alluaudomyia maculithorax, 76
Alluaudomyia marmorata, 76
Alluaudomyia melanosticta, 76
Alluaudomyia polyommata **sp. n.**, 76
Alluaudomyia wansoni, 76, 77
ALUCITIDAE, 42
Amauris lobengula septentrionis, 55
ambigua, *Speiseria*, 39
amorphochili, *Synthesiostrebla*, 39, 40
Anebolura, 117
annulifera, *Mansonia*, 86, 87
anomala, *Epipyrops*, 58
Anopheles aconitus, 87
Anopheles barbirostris, 86, 87, 89
Anopheles elutus, 79, 80, 82, 83, 84
Anopheles farauti, 86, 87, 90
Anopheles fluviatilis, 84
Anopheles hyrcanus, 89
Anopheles hyrcanus nigerrimus, 87, 89
Anopheles jeyporiensis, 88
Anopheles maculipennis, 79, 83, 84
Anopheles maculipennis atroparvus, 80, 81, 82, 83, 84
Anopheles maculipennis labranchiae, 80, 83, 84
Anopheles maculipennis maculipennis, 80, 81, 82, 83
Anopheles maculipennis melanoon, 84
Anopheles maculipennis messeae, 80, 81, 82, 83
Anopheles maculipennis subalpinus, 84
Anopheles martini, 86, 87, 89
Anopheles minimus, 84, 88
Anopheles moluccensis, 90
Anopheles pensati, 89
Anopheles punctulatus, 87, 90
Anopheles pursati, 86, 87, 89
Anopheles sinensis, 86, 87, 89
Anopheles sinensis lesteri, 89
Anopheles sinensis pseudosinensis, 89
Anopheles vincenti, 86, 87, 88
ANTHOMYIDAE, 33
Anthomyia minuta, 33, 34
Aprionyx natalica, 125
ardates, *Nacaduba nora*, 4, 6
arenarius, *Culicoides*, 75
Aricia atomaria, 33, 34
Astenus distinctus **sp. n.**, 114
Astenus fauveli, 115
atomaria, *Aricia*, 33, 34
atomaria, *Egle*, 33, 34
atomarius, *Heterostylus*, 34
Atrichopogon, 72, 73, 74
Atrichopogon africanus, 72, 73
Atrichopogon atriscapula, 73
Atrichopogon aegyptius, 69, 72, 73, 74
Atrichopogon homoius, 72, 73
Atrichopogon phrixus, 73
Atrichopogon xanthoaspidius, 74
atriscapula, *Atrichopogon*, 73
atroparvus, *Anopheles maculipennis*, 80, 81, 82, 83, 84
Atropos formicaria, 35, 36
aurantiacus, *Culicoides*, 75
auricularia, *Forficula*, 63, 65
auriculata, *Adenophlebia*, 124, 125
austeni, *Culicoides*, 74
Austrocaenis capensis, 125
Austrocloëon africanum, 124
auxileuca, *Cosmoclostis*, 45, 46

BAETIDAE, 92, 124
bakeri, *Liposcelis*, 35, 38, 109, 112, 113
Ballistura, 102
barbirostris, *Anopheles*, 86, 87, 89
bedfordi, *Culicoides*, 74
bengalense, *Cloëon*, **sp. n.**, 95, 98
Bezzia, 78
biannulata, *Forcipomyia*, 69
bicolor, *Cloëon*, **sp. n.**, 97, 98
Bidessus cribrosus, 134
Bidessus dakarensis, 136
Bidessus sodalis, 136
bimaculatum, *Procloëon*, 92, 95
binotatum, *Conosoma*, 116
Blepharrhymenus, 118
boafoensis, *Tylococcus*, **sp. n.**, 149, 151
BOMBYLIIDAE, 105
Bombyx, 58

bowringii, Fulgoraecia, 58
brachybela, Cosmoclostis, **sp. n.**, 43, 44, 45
BRACHYCERCIDAE, 125
Brachyusa minor **sp. n.**, 118
Brachyusa raptoria, 118
Brahmaea cilicica, 63
buqueti, Cybister, 140
burri, Pseudisolabis, 60, 61, 63, 66

CAENIDAE, 92, 99
Caenis, 92
Caenis picea **sp. n.**, 99
Caenis piscina **sp. n.**, 99
Calandra, 110
caliginosa, Lasiohelea, 29
candelaria, Fulgora, 58
Canthydrus xanthinus, 133
capensis, Austrocaenis, 125
CARCINOPHORINAE, 67
castanea, Forcipomyia, 71
Cataclipson, 27
catochrous, Charaxes, 54
Celastrina lilacea, 7
Celastrina puspa felderi, 7
Celastrina puspa moorei, 7
celtis, Pseudococcus, **sp. n.**, 154
cenea-ochracea, Papilio dardanus, 55
CERATOPOGONIDAE, 69
Cereaxina, 63
cerolestes, Fulgoraecia, **sp. n.**, 57
ceylonica, Nacaduba pactolus, 3, 4
chalconota, Cosmoclostis, **sp. n.**, 43
Charaxes, 53
Charaxes achaemenes, 53
Charaxes boueti lasti, 53
Charaxes boueti macclounii, 53
Charaxes catochrous, 54
Charaxes druceanus kivuanus, 53
Charaxes druceanus teita, 53
Charaxes ethalion, 53, 54
Charaxes ethalionoides, 53, 54
Charaxes etheocles, 53, 54
Charaxes numenes numenes, 53
Charaxes vansomereni, 54
Charaxes violae, 54
Choroterpes nigrescens, 126
Chortophila nigrifrons, 33, 34
chrysolopha, Forcipomyia, 70
chrystallinus, Systoechus, 105
cilicica, Brahmaea, 63
cingalensis, Horaga onyx, 9
citri, Pseudococcus, 156
clarki, Potamonectes, 138
Cloëon, 92
Cloëon aeneum, 124
Cloëon bengalense **sp. n.**, 95, 98
Cloëon bicolor **sp. n.**, 97, 98
Cloëon dipterum, 92, 96, 98
Cloëon marginale, 95, 98
Cloëon pulchella, 98
Cloëon taeniolatum, 98
Cloëon viridis **sp. n.**, 98
Clypeodytes (s. str.) *cribrosus*, 134, 135
Clypeodytes (*Leiodytes*) *distinctus* **sp. n.**, 135, 136
Clypeodytes (*Leiodytes*) *evanescens*, 135, 136
Conoblemmus, 16
Conosoma alienum **sp. n.**, 117
Conosoma binotatum, 116
Conosoma fraternum **sp. n.**, 116
Conosoma immaculatum, 116
Conosoma littoreum, 117
Conosoma separatum **sp. n.**, 116
Conosoma separatum aberrans **var. n.**, 116
contiguus, Aëdes (*Stegomyia*), 131
cooperi, Notonurus, **sp. n.**, 124, 126, 127
Copelatus flavidus, 140
Copelatus lewisi **sp. n.**, 138, 140
Copelatus ornatipennis, 140
Copelatus vigintistriatus, 140
Cophaphonus, 16
Cophaphonus privatus **sp. n.**, 17, 18
Cophaphonus riparius **sp. n.**, 17
Cophaphonus tshirkunae **sp. n.**, 17, 19
Cophaphonus zimini, 17, 19
corsoni, Forcipomyia, 69
Cosmoclostis, 42, 43, 46
Cosmoclostis aglaodesma, 42, 43, 44, 46, 48, 49
Cosmoclostis aglaodesma aglaodesma, 42
Cosmoclostis auxileuca, 45, 46
Cosmoclostis brachybela **sp. n.**, 43, 44, 45
Cosmoclostis chalconota **sp. n.**, 43
Cosmoclostis hemiadelpha **sp. n.**, 48, 49
Cosmoclostis lamprosema **sp. n.**, 48, 50, 52
Cosmoclostis leucomochla **sp. n.**, 45, 46, 48
Cosmoclostis pesseuta, 45, 46
Cosmoclostis premnicola, 45, 46, 48
Cosmoclostis quadriquadra, 46
cribrosus, Bidessus, 134
cribrosus, Clypeodytes (s. str.), 134, 135
cribrosus, Hydroporus, 134
cruentata, Metaphaena, 57
Cryptobium morosum **sp. n.**, 115
Culex, 87
Culex kermorganti, 86, 87
CULICIDAE, 13, 86, 129
Culicoides, 69, 75, 76
Culicoides arenarius, 75
Culicoides aurantiacus, 75
Culicoides austeni, 74
Culicoides bedfordi, 74
Culicoides distinctipennis egypti, 74
Culicoides fulvithorax, 74
Culicoides fuscicaudae **sp. n.**, 75
Culicoides grahami, 74
Culicoides inornatipennis, 75, 76
Culicoides judaeae, 76
Culicoides mahensis, 75
Culicoides milnei, 74
Culicoides neavei, 74
Culicoides pallidipennis, 74
Culicoides praetermissus, 74
Culicoides puripennis, 75
Culicoides pycnostictus, 74
Culicoides ravus, 76
Culicoides rutilus, 75
Culicoides scotti, 75
Culicoides schultzei, 75
Culicoides similis, 75
Culicoides vitreipennis, 75, 76
Cyaniris, 7
Cybister buqueti, 140
Cybister dytiscoides, 140

cylindrica, Tropidopola, 64
czizeki, Tipula, 123

dakarensis, Bidessus, 136
dakarensis, Guignotus, 136, 137
dardanus, Papilio, 55
darfurensis, Yola (s. str.), **sp. n.**, 136
Dasyhelea, 75
Dasyhelea inconspicuosa egypti, 74
Diacrotricha pesseuta, 45
didymoides, Helochares (*Hydrobaticus*), **sp. n.**, 141, 142
didymus, Helochares (*Hydrobaticus*), 141, 142
dipterum, Cloëon, 92, 96, 98
distinctus, Astenus, **sp. n.**, 114
distinctus, Clypeodytes (*Leiodytes*), **sp. n.**, 135, 136
divergens, Liposcelis, 35, 37, 38
dolus, Helochares (*Hydrobaticus*), 140
dracaenae, Eretmapodites, 13, 14, 15
DYSTICIDAE, 141
dytiscoides, Cybister, 140

ECDYONURIDAE, 126
Ecdyonurus, 126
Egle atomaria, 33, 34
Egle parva, 33
egypti, Culicoides distinctipennis, 74
egypti, Dasyhelea inconspicuosa, 74
egypti, Forcipomyia, 69, 70
elegans, Euthraulus, 126
elegans, Pseudisolabis, 60, 61, 62, 66
elongatum, Enallagma, 143, 145, 146
elongatum, Ischnura, 143, 146
elutus, Anopheles, 79, 80, 82, 83, 84
embuensis, Aëdes (*Finlaya*), 130
EMPIDIDAE, 21
Enallagma abyssenicum, 145
Enallagma elongatum, 143, 145, 146
Enallagma fractum, 143, 145, 146
Enallagma longfieldae **sp. n.**, 146
Enallagma pseudelongatum, 143, 145, 146
Enallagma subfurcatum, 145
Enallagma subtile, 145
ENDOMYCHIDAE, 63
entomophilus, Lipsocelis, 109, 111, 112, 113
Epipyrops anomala, 58
EPIPYROPIDAE, 57, 58
Eretmapodites, 13
Eretmapodites dracaenae, 13, 14, 15
Eretmapodites ferox, 13, 14, 15
Eretmapodites hightoni **sp. n.**, 13, 14, 15
ethalion, Charaxes, 53, 54
ethalionoides, Charaxes, 53, 54
etheocles, Charaxes, 53, 54
Eumetrioptera, 23, 24
Eumetrioptera monochroma **sp. n.**, 23, 24
Eumetrioptera pavlovskyi, 23
Euthraulus elegans, 126
evanescens, Clypeodytes (*Leiodytes*), 135, 136

fairchildi, Vermitigris, 21, 22
farauti, Anopheles, 86, 87, 90
fauriei, Pezotettix, 11
fauveli, Astenus, 115
felderi, Celastrina puspa, 7
felderi, Lycaenopsis puspa, 7
ferox, Eretmapodites, 13, 14, 15
ficivora, Ibocoris, **sp. n.**, 27
Ficus, 28
fieberi, Podisma, 12
fitchi, Proisotoma, 102
fitchioides, Proisotoma, **sp. n.**, 101
flavicornis, Papilio dardanus, **subsp. n.**, 55
flacidus, Copelatus, 140
fluviatilis, Anopheles, 84
Forcipomyia, 69
Forcipomyia biannulata, 69
Forcipomyia castanea, 71
Forcipomyia chrysolopha, 70
Forcipomyia corsoni, 69
Forcipomyia egypti, 69, 70
Forcipomyia ingrami, 69, 70
Forcipomyia inornatipennis, 70
Forcipomyia lasionota, 72
Forcipomyia lepidota, 70
Forcipomyia ornaticrus, 70
Forcipomyia sudanensis **sp. n.**, 70
Forficula, 68
Forficula aetolica, 65
Forficula auricularia, 63, 65
Forficula hincksi **sp. n.**, 64, 68
Forficula kaznakovi, 65
Forficula lesnei, 65
Forficula lurida, 63, 65
Forficula pubescens, 65
Formica fuliginosa, 36
formicaria, Atropos, 35, 36
formicaria, Liposcelis, 35, 36, 37, 38
formosanum, Podisma, 11
fractum, Enallagma, 143, 145, 146
fraternum, Conosoma, **sp. n.**, 116
Fulgora, 58
Fulgora candelaria. 58
Fulgora laternaria, 57
Fulgoraecia, 57
Fulgoraecia bowringii, 58
Fulgoraecia cerolestes **sp. n.**, 57
Fulgoraecia fulvipunctata, 57
fuliginosa, Formica, 36
fulvipunctata, Fulgoraecia, 57
fulvithorax, Culicoides, 74
fumida, Leptusa, 117
fuscicaudae, Culicoides, **sp. n.**, 75

gimmerthali, Tipula, 120, 121, 123
glenniei, Typhlomalota, **sp. n.**, 30
Gomphomastax, 25
Gomphomastax robusta, 25
graeca, Isolabella, 61
grahami, Culicoides, 74
grandicollis, Yola, 137
granicola, Liposcelis, 35
gregaria, Schistocerca, 107
grossepunctata, Maresia, **sp. n.**, 117
GRYLLIDAE, 16
Guignotus dakarensis, 136, 137
Guignotus virgatipennis, 136

harveyi, Procloëon, **sp. n.**, 94
Helochares (*Hydrobaticus*) *didymoides* **sp. n.**, 141, 142
Helochares (*Hydrobaticus*) *didymus*, 141, 142

Helochares (*Hydrobaticus*) *dolus*, 140
Helochares (*Hydrobaticus*) *tamsi* **sp. n.**, 142
hemiadelpha, *Cosmoclostis*, 48, 49
Heptagenia, 126
Herophydrus nodieri, 137
Heterostylus, 33
Heterostylus pratensis, 33
Heterostylus atomarius, 34
Heterostylus nominabilis **nom. nov.**, 34
Heterostylus piliferus, 33
Heterota pictipennis, 118
Heterota vinsoni **sp. n.**, 118
hightoni, *Eretmapodites*, **sp. n.**, 13, 14, 15
hincksi, *Forficula*, **sp. n.**, 64, 68
hissarica, *Paedomastax*, 24
Holoconops kerteszi, 69
homoius, *Atrichopogon*, 72, 73
Homalota, 30
Horaga, 3
Horaga albimacula viola, 9
Horaga onyx cingalensis, 9
Hydroporus cribrosus, 134
Hypericum perforatum, 34
hyperici, *Pegomyia*, **nom. nov.**, 34
hyrcanus, *Anopheles*, 89

Ibocoris **gen. n.**, 27
Ibocoris ficivora **sp. n.**, 27
immaculatum, *Conosoma*, 116
immsi, *Medon*, 115
immsi, *Pseudisolabis*, 60, 61, 63, 66
indica, *Nacaduba dubiosa*, 4, 6
infasciatus, *Vermitigris*, **sp. n.**, 22
ingrami, *Aedes* (*Finlaya*), 129, 131
ingrami, *Forcipomyia*, 69, 70
inornatipennis, *Culicoides*, 75, 76
inornatipennis, *Forcipomyia*, 70
insignicornis, *Lasiohelea*, **sp. n.**, 29
Ionolyce helicon viola, 4, 7
irrorata, *Tipula*, 120, 121
Ischnura elongatum, 143, 146
Isolabella graeca, 61

jeyporiensis, *Anopheles*, 88
judaeae, *Culicoides*, 76

Karschiellinae, 67
kaznakovi, *Forficula*, 65
kermorganti, *Aëdes*, 86, 87
kermorganti, *Culex*, 86, 87
kermorganti, *Mucidus*, 87
kerteszi, *Holoconops*, 69
kivuanus, *Charaxes druceanus*, 53
kodamae, *Podisma*, 11
kodi, *Nacaduba nora*, 4
kosswigi, *Pseudisolabis*, 60, 61, 63, 64, 66, 67, 68
kowakamii, *Podisma*, 11
kummi, *Aëdes* (*Dunnius*), 132

Labidura riparia truncata, 63
Labiduridae, 68
labranchiae, *Anopheles maculipennis*, 80, 83, 84
Laemophloeus, 110
Lampromyia, 21
Lampromyia orientalis, 21
lamprosema, *Cosmoclostis*, **sp. n.**, 48, 50, 52
Lasiohelea, 29, 30
Lasiohelea caliginosa, 29
lasionota, *Forcipomyia*, 72
Lasiohelea insignicornis **sp. n.**, 29
lasti, *Charaxes boueti*, 53
laternaria, *Fulgora*, 57
lepidota, *Forcipomyia*, 70
Leptophlebiidae, 125
Leptusa fumida, 117
Leptusa minuta **sp. n.**, 117
lesnei, *Forficula*, 65
lesteri, *Anopheles sinensis*, 89
leucomochla, *Cosmoclostis*, **sp. n.**, 45, 46, 48
lewisi, *Copelatus*, **sp. n.**, 138, 140
lilacea, *Celastrina*, 7
liparus, *Liposcelis*, 35, 38
Liposcelidae, 35, 109
Liposcelis, 35, 36
Liposcelis bakeri, 35, 38, 109, 112, 113
Liposcelis divergens, 35, 37, 38
Liposcelis entomophilus, 109, 111, 112, 113
Liposcelis formicaria, 35, 36, 37, 38
Liposcelia granicola, 35
Liposcelis liparus, 35, 38
Liposcelis luridus, 35, 38, 112
Liposcelis paetus, 35
Lispinus propinquus, 114
Liposcelis pubescens, 35, 37, 38, 112
Liposcelis subfuscus, 35, 37, 38
Liposcelis virgulatus, 109, 112, 113
Lispinus specialis **sp. n.**, 114
littoreum, *Conosoma*, 117
Locustana pardalina, 105
lofaoshana, *Podisma*, 11
longfieldae, *Enallagma*, **sp. n.**, 146
lurida, *Forficula*, 63, 65
luridus, *Liposcelis*, 35, 38, 112
Lycaenidae, 3
Lycaenopsis, 7
Lycaenopsis puspa felderi, 7
Lymnastis, 63
lynesi, *Potamonectes* (**s. str.**), **sp. n.**, 137

macclounii, *Charaxes boueti*, 53
macrocera, *Tipula*, 120, 121
maculatus, *Papilio dardanus*, 56
maculipennis, *Anopheles*, 79, 83, 84
maculipennis, *Anopheles maculipennis*, 80, 81, 82, 83
maculithorax, *Alluaudomyia*, 76
madagascariensis, *Tylococcus*, 151
madecassa, *Palaminus*, 114
mahensis, *Culicoides*, 75
malacanthae, *Tylococcus*, **sp. n.**, 149, 152
Mansonia annulifera, 86, 87
Mansonia seguini, 87
Maresia **gen. n.**, 117
Maresia grossepunctata **sp. n.**, 117
marginale, *Cloëon*, 95, 98
marmorata, *Alluaudomyia*, 76
martini, *Anopheles*, 86, 87, 89
mauritiana, *Newsteadia*, 31
mauritiensis, *Tylococcus*, 154
Medon immsi, 115
Medon vinsoni **sp. n.**, 115
melanoon, *Anopheles maculipennis*, 84

melanosticta, Alluaudomyia, 76
messeae, Anopheles maculipennis, 80, 81, 82, 83
Metaphaena cruentata, 57
Metaphaena militaris, 57
Microdeuterus, 27
mikado, Pezottetix, 11
militaris, Metaphaena, 57
milnei, Culicoides, 74
minima, Nacaduba beroë, 3, 5
minimus, Anopheles, 84, 88
minor, Brachyusa, **sp. n.**, 118
minuta, Anthomyia, 33, 34
minuta, Leptusa, **sp. n.**, 117
minuta, Pegomyia, 33, 34
Miramella, 10, 11
Miramella shirakii, 11
Miramella splendida, 11
moluccensis, Anopheles, 90
monochroma, Eumetrioptera, **sp. n.**, 23, 24
montana, Newsteadia, **sp. n.**, 31
montanus, Palaminus, **sp. n.**, 114
moorei, Celastrina puspa, 7
morosum, Cryptobium, **sp. n.**, 115
Mucidus kermorganti, 87
MYRMELEONIDAE, 21

nabo, Nacaduba hermus, 4
nabo, Nacaduba pavana, 1
Nacaduba, 1, 3, 4
Nacaduba berenice ormistoni, 3, 6
Nacaduba beroë minima, 3, 5
Nacaduba calauria toxopeusi, 3, 5
Nacaduba dubiosa indica, 4, 6
Nacaduba hermus nabo, 4
Nacaduba kurava prominens, 3, 4
Nacaduba nabo sidoma, 2, 3, 4
Nacaduba nora ardates, 4, 6
Nacaduba nora kodi, 4
Nacaduba noreia noreia, 4, 6
Nacaduba ollyetti **sp. n.**, 1, 3, 4
Nacaduba pactolus ceylonica, 3, 4
Nacaduba pavana nabo, 1
Nacaduba sanaya, 1
Nacaduba sinhala, 3, 5
natalensis, Yola, 137
natalica, Aprionyx, 125
neavei, Culicoides, 74
Newsteadia, 31
Newsteadia mauritiana, 31
Newsteadia montana **sp. n.**, 31
nigerrimus, Anopheles hyrcanus, 87, 89
nigrescens, Choroterpes, 126
nigrifrons, Chortophila, 33, 34
nigrifrons, Pegomyia, 34
nilgiris, Proisotoma, **sp. n.**, 102
niloticus, Vermileo, 21
nodieri, Herophydrus, 137
nominabilis, Heterostylus, **nom. nov.**, 34
noreia, Nacaduba noreia, 4, 6
Notonurus **gen. n.**, 124, 126
Notonurus cooperi **sp. n.**, 124, 126, 127
numenes, Charaxes numenes, 53
NYMPHALIDAE, 53

Odontopodisma, 10, 12
ollyetti, Nacaduba, **sp. n.**, 1, 3, 4
Orgyia, 58
orientalis, Lampromyia, 21
orientalis, Vermitigris, 22
ormistoni, Nacaduba berenice, 3, 6
ornaticrus, Forcipomyia, 70
ornatipennis, Copelatus, 140

Paederus rubidus **sp. n.**, 114
Paedomastax, 25
Paedomastax hissarica, 24
paetus, Liposcelis, 35
pagana, Tipula, 120, 122, 123
Palaminus madecassa, 114
pallidipennis, Culicoides, 74
Palaminus montanus **sp. n.**, 114
Palpomyia, 69
Palpomyia platyura **sp. n.**, 77
Panoplites seguini, 86, 87
Papilio dardanus, 55
Papilio dardanus cenea-ochracea, 55
Papilio dardanus flavicornis **subsp. n.**, 55
Papilio dardanus maculatus, 56
Papilio dardanus polytrophus, 56
Papilio dardanus tibullus, 56
Paracyphea, 117
Paraleptusa, 30
Parapodisma **gen. n.**, 10, 11
pardalina, Locustana, 105
PARISOLABINAE, 67, 68
Parisolabis, 60, 67
Parisopsalis, 60
parva, Egle, 33
pavlovskyi, Eumetrioptera, 23
Pegomyia, 33, 34
Pegomyia hyperici **nom. nov.**, 34
Pegomyia minuta, 33, 34
Pegomyia nigrifrons, 34
pensati, Anopheles, 89
PENTATOMIDAE, 27
perforatum, Hypericum, 34
peringueyi, Afronurus, 126
pesseuta, Cosmoclostis, 45, 46
pesseuta, Diacrotricha, 45
Petrelaea dana adima, 4, 7
Pezotettix, 11
Pezotettix fauriei, 11
Pezotettix mikado, 11
Philonthus (Gabrius) vinsoni **sp. n.**, 116
phrixus, Atrichopogon, 73
picea, Caenis, **sp. n.**, 99
pictipennis, Heterota, 118
piliferus, Heterostylus, 33
piscina, Caenis, **sp. n.**, 99
PLATYCNEMIDAE, 148
platyura, Palpomyia, **sp. n.**, 77
Podisma, 10, 11, 12
Podisma fieberi, 12
Podisma formosanum, 11
Podisma kodamae, 11
Podisma kowakamii, 11
Podisma lofaoshana, 11
Podisma sapporense, 11
Podisma subaptera, 11
polyommata, Alluaudomyia, 76
Polyommatus, 7
polytrophus, Papilio dardanus, 56
Potamonectes clarki, 138

Potamonectus (s. str.) *lynesi* **sp. n.**, 137
praetermissus, Culicoides, 74
pratensis, Heterostylus, 33
premnicola, Cosmoclostis, 45, 46, 48
privatus, Cophaphonus, **sp. n.**, 17, 18
Procloëon, 92, 93
Procloëon bimaculatum, 92, 95
Procloëon harveyi **sp. n.**, 94
Proisotoma fitchi, 102
Proisotoma fitchioides **sp. n.**, 101
Proisotoma nilgiris **sp. n.**, 102
prominens, Nacaduba kurava, 3, 4
propinquus, Lispinus, 114
pseudelongatum, Enallagma, 143, 145, 146
Pseudisolabis, 60, 61, 63, 66, 67, 68
Pseudisolabis burri, 60, 61, 63, 66
Pseudisolabis elegans, 60, 61, 62, 66
Pseudisolabis immsi, 60, 61, 63, 66
Pseudisolabis kosswigi **sp. n.**, 60, 61, 63, 64, 66, 67, 68
Pseudisolabis renschi, 60, 61, 62
Pseudisolabis tenera, 60, 61, 63, 66
Pseudisolabis walkeri, 60, 61
Pseudococcus, 149
Pseudococcus celtis **sp. n.**, 154
Pseudococcus citri, 156
Pseudomyrmedon **gen. n.**, 118
Pseudomyrmedon alienus **sp. n.**, 118, 119
Pseudopodisma **gen. n.**, 11
pseudosinensis, Anopheles sinensis, 89
Pseudostrebla, 39
Pterobosca, 30
pubescens, Forficula, 65
pubescens, Liposcelis, 35, 37, 38, 112
pulchella, Cloëon, 98
punctulatus, Anopheles, 87, 90
puripennis, Culicoides, 75
pursati, Anopheles, 86, 87, 89
pycnostictus, Culicoides, 74
PYGIDICRANIDAE, 66

quadriquadra, Cosmoclostis, 46

raptoria, Brachyusa, 118
ravus, Culicoides, 76
renschi, Pseudisolabis, 60, 61, 62
RHAGIONIDAE, 21
riparius, Cophaphonus, **sp. n.**, 17
robusta, Gomphomastax, 25
rubidus, Paederus, **sp. n.**, 114
rutilus, Culicoides, 75

sanaya, Nacaduba, 1
sapporense, Podisma, 11
Schistocerca gregaria, 107
SCHISTOGENIAE, 118
schultzei, Culicoides, 75
scotti, Culicoides, 75
seguini, Mansonia, 87
seguini, Panoplites, 86, 87
separatum, Conosoma, **sp. n.**, 116
septentrionis, Amauris lobengula, 55
shirakii, Miramella, 11
sidoma, Nacaduba nabo, 2, 3, 4
similis, Culicoides, 75
simplex, Systoechus, 105
sinensis, Anopheles, 86, 87, 89
sinhala, Nacaduba, 3, 5
sodalis, Bidessus, 136
soleatus, Aëdes (*Stegomyia*), 131, 132
somali, Systoechus, **sp. n.**, 105
specialis, Lispinus, **sp. n.**, 114
Speiseria ambigua, 39
Spelaecritus, 63
Sphaeromias, 78
splendida, Miramella, 11
STAPHYLINIDAE, 30, 114
Stizostrebla, 39
STREBLIDAE, 39
subalpinus, Anopheles maculipennis, 84
subaptera, Podisma, 11
subfurcatum, Enallagma, 145
subfuscus, Liposcelis, 35, 37, 38
subtile, Enallagma, 145
sudanensis, Forcipomyia, **sp. n.**, 70
sylvatica, Adenophlebia, 125
Synthesiostrebla, 40
Synthesiostrebla amorphochili, 39, 40
Systoechus chrystallinus, 105
Systoechus simplex, 105
Systoechus somali **sp. n.**, 105
Systoechus vulpinus, 105
Systoechus xerophilus, 105

taeniolatum, Cloëon, 98
tamsi, Helochares (*Hydrobaticus*), **sp. n.**, 142
teita, Charaxes druceanus, 53
Teloganodes, 95
tenera, Pseudisolabis, 60, 61, 63, 66
TETTIGONIIDAE, 23
tibullus, Papilio dardanus, 56
TIPULIDAE, 120, 122
Tipula czizeki, 123
Tipula gimmerthali, 120, 121, 123
Tipula irrorata, 120, 121
Tipula macrocera, 120, 121
Tipula pagana, 120, 122, 123
Tipula unca, 120
toxopeusi, Nacaduba calauria, 3, 5
Tribolium, 110
Tropidopola cylindrica, 64
truncata, Labidura riparia, 63
tshirkunae, Cophaphonus, **sp. n.**, 17, 19
Tylococcus boafoensis **sp. n.**, 149, 151
Tylococcus malacanthae **sp. n.**, 149, 152
Tylococcus madagascariensis, 151
Tylococcus mauritiensis, 154
Typhlomalota **gen. n.**, 30
Typhlomalota glenniei **sp. n.**, 30

unca, Tipula, 120

vansomereni, Charaxes, 54
Vermileo niloticus, 21
Vermileo vermileo, 21
Vermitigris, 21, 22
Vermitigris fairchildi, 21, 22
Vermitigris infasciatus **sp. n.**, 22
Vermitigris orientalis, 22
vigintistriatus, Copelatus, 140
vincenti, Anopheles, 86, 87, 88
vinsoni, Heterota, **sp. n.**, 118
vinsoni, Medon, **sp. n.**, 115
vinsoni, Philonthus (*Gabrius*), **sp. n.**, 116
vinsoni, Xantholinus, **sp. n.**, 115

viola, Horaga albimacula, 9
viola, Ionolyce helicon, 4, 7
violae, Charaxes, 54
virgatipennis, Guignotus, 136
virgulatus, Liposcelis, 109, 112, 113
viridis, Cloëon, **sp. n.**, 98
vitreipennis, Culicoides, 75, 76
vulpinus, Systeochus, 105

walkeri, Pseudisolabis, 60, 61
wansoni, Alluaudomyia, 76, 77
wellmani, Aëdes (*Finlaya*), 129
xanthinus, Canthydrus, 133
xanthoaspidius, Atrichopogon, 74
Xantholinus vinsoni **sp. n.**, 115
xerophilus, Systoechus, 105

Yola (s. str.) *darfurensis* **sp. n.**, 136
Yola grandicollis, 137
Yola natalensis, 137

zimini, Cophaphonus, 17, 19

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